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THE INFLUENCE OF GEOGRAPHIC ENVIRONMENT
ON THE LOWER ST. LAWRENCE.

BY

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An expedition on foot through the continuous stretch of villages which line the north shore of the St. Lawrence for thirty miles below Quebec, through the long, attenuated groups which occupy a narrow hem of land farther down the river at Bay St. Paul and Murray Bay, and, lower still, through the old trading-station of Tadoussac, which clutches the glacier-worn rocks at the mouth of the Saguenay, reveals much that speaks eloquently to one interested in the relation between development and environment, that is, to the anthropogeographer. It takes him through a country which had its thriving settlements before the Dutch trading-station at the mouth of the Hudson became the English town of New York, and before Philadelphia was laid out on the lower Delaware, a country which is located at the chief eastern gateway of the continent, which commands a great waterway of river and lake extending over two thousand miles into the vast interior, and which has seen an increasing tide of men and merchandise sweeping upstream from transatlantic lands, and downstream from the bustling centres of commercial activity along the shores of the Great Lakes. But the observer realizes that this location, midway on the great thoroughfare between Anglo-Saxon England and Anglo-Saxon America, has availed nought. He finds himself in the midst of an old-world Catholic peasantry, speaking only French and a French, moreover, reminiscent of the seventeenth or eighteenth century, dressing in garments of homespun cut by a Norman or Breton pattern, displaying in their manners the unhurried courtesy and untutored polish which belong only to an old-world civilization, while their quaint figures harmonize well with the wayside oratories and the sound of the spinning-wheel issuing from every cottage door.

The Canadian province of Quebec contains the only considerable offshoot of the French race to be found in the world, an offshoot comparable to that of the Spanish in Central America, of the Dutch in South Africa, and of the English in many lands. This France of the Western Hemisphere is an anomaly. Half as large again as its mother country, with a population of less than five to the square mile, it offers the abundance of land that distinguishes all new-world conditions and that constitutes the chief stimulus to progress of every large colonial territory. And yet this country of the Lower St. Lawrence presents the contradiction of an eighteenth-century France in a twentieth-century Canada. It is the only great colony successfully established by that nation proverbially unsuccessful in colonizing ventures; a rapidly increasing branch of an unprolific race which is now struggling at home with the problem of a stationary population; a conservative offshoot of a people who in many lines have reached the outmost limits of radicalism. It is more French than the citizens of Ontario or the United States are English; nearer the France of Henry of Navarre than are the Parisians of to-day; more conservative in its Catholicism than the new incumbent of the chair of St. Peter. Despite nearly a century and a half of English rule, despite the example of bustling Anglo-Saxon neighbors on its west and south, despite the stimulation of new-world conditions, it has maintained its own characteristics almost unmodified, has remained French and almost mediæval.

The causes which have operated thus to arrest the development of the French in Canada and resist their absorption by the far larger surrounding body of English have been in part racial and historical, but in larger part geographical; for the reason that geographical influences are more fundamental, more stable, more persistent. They operate year in and year out, by decades and by centuries, subject to little variation, and susceptible of relatively slight modification by human agencies. French Canada is especially interesting to the anthropogeographer, as showing the interplay of heredity and environment, of race and geographic condition. The race factor in the equation of which the French-Canadian is to-day the resultant comes out in the character of early French colonization in America. New France, by the terms of its settlement, was only an extension of old France into this northern wilderness. The colonist, true to the race psychology of the Gallic mind, came not by individual initiative, as did the English settler farther south, but under the guidance of monarch,

noble, and priest; he was held beneath the sway of a strongly-organized Church to which he owed his tithes, of a feudal lord from whom he received his land on the payment of seigniorial dues, and of privileged trading companies who held their monopolies by royal grant and who restricted to a minimum the settler's share in the commerce of the country. Thus were imported the habit of submission to authority, exclusion from political affairs, the ascendancy of the Catholic Church, and acquiescence in poverty, all which together made up the point of view of the old-world peasant of France.

With the transfer of Canada to Great Britain certain historical factors came into operation. Antagonism to the English conquerors showed itself by an increased devotion on the part of the French to their Church, which was now the sole representative of the old régime. The Church, always a conservative influence, in turn exercised all its powers to inculcate adherence to the old institutions and the preservation of the French language as the surest basis of Catholic supremacy before the advancing Protestantism of the progressive sovereign race. A difference in language and religion thus helped to keep English and French apart.

The persistence of the French-Canadians was aided by the fact that soon after the conquest their tricolor flag, their language, civil laws, religion, and their own system of education were guaranteed to these new subjects of Great Britain. In 1791 William Pitt carried a measure through the House of Commons constituting separate provinces of the French and English areas in Canada, with the avowed purpose of keeping them distinct in language, laws, and religion, and encouraging their natural antagonism, in order to prevent the possibility of their combining for revolt against the British Government, as the Thirteen Colonies had done.

But stronger than the influence of race or the over-cautious policy of an English statesman has been the factor of geographic conditions. The severe climate of a far-northern region, located on the outer margin of habitable North America, the small area suitable for agriculture, and the paucity of other natural resources have in combination operated as an obstacle to the accumulation of wealth which is the inevitable harbinger of progress, and as a barrier to the immigration which would have invaded the exclusive domain of the French language, hastened the process of absorption by the English, and stimulated economic development. It is along the Lower St. Lawrence that we find to-day the purest French stock and the quaintest mediæval civilization. If this region had

had the climate of the Potomac, or the broad, fertile slopes of the Mississippi basin, or the mineral wealth of the upper Ohio valley, it could not possibly have preserved an old France on this great highway of the new world. But here geographic conditions have conspired to crystallize a body of foreign institutions and maintain a foreign language, and these two in turn have added their strength to the isolation caused by an adverse physical environment. Here has been action and reaction, the isolation of environment reinforcing the barrier of race differences, and these intensified race differences in turn adding a Chinese wall of exclusion to the barrier which nature had set up.

But while geographic conditions favored the survival of many old-world institutions here, they also imposed upon the early French colonist certain radical changes in his economic life, whereby it should become adapted to his peculiar far-northern environment. These modifications, once introduced, became crystallized, and linger to-day in Lower Canada as survivals from the earliest phase of economic development in the American wilderness. The French-Canadian settler found himself located in a part of America where a harsh climate would forever rob agriculture of the large profits necessary for the support of a young and undeveloped colony. Here the tobacco crops of Virginia, or the wheat of Maryland, or the sugar of the West Indies found no parallel; but a vast system of rivers and lakes, reaching by short portages to the sources of the Mississippi and the shores of Hudson Bay, far into the cold land of the rich peltries, enabled the French colonist to exploit the one great natural resource of his country at that time available—its furs. Henceforth he was drawn irresistibly into the nomadic life of the trapper and fur-trader; the *voyageur* and *courieur de bois* became for a long time the typical American subject of Louis XIV. and his successors.

The fur trade became in Canada the accepted basis of colonial wealth; but as an economic and social institution it meant a long backward step. The fur trade in its essence belonged to the primitive economy of a savage life. It was a deterrent to progress in civilization. Its conditions were a broad, unsettled wilderness as a vast game preserve, a minimum of population to a maximum of territory, a nomadic life for the trapper assimilated to that of the Indian with whom he traded. Its uneconomic character is indicated by the fact that it was not susceptible of development under the prevailing method of indiscriminate killing of fur-bearing animals, whether young or mature, female or male. On the contrary,

every increase in the annual stock of peltries brought down the ice-rimmed streams of Canada in the spring to the markets of Montreal and Quebec promised the more surely the annihilation of the future supply.

The effect of the fur trade upon the French colonists was a dislike of the slower methods of agriculture, with its prosy, stay-at-home life; while the wide dispersal of the trapping population for eight months of the year over the remote wilderness of the frozen North operated against the political development of the colony along modern lines. Even the character and distribution of the permanent settlements reflected the needs of the fur trade. The rivers and lakes of eastern Canada were the highway of the voyageur's birchbark canoe and more substantial pirogue, which became in consequence the regular vehicle of travel throughout the territory. In every new country rivers are the earliest highways, and their banks become the favorite site of settlements, both because of ease of communication and the fertile soil sure to be found there. But French Canada developed a type of river settlement peculiar to itself, closely adapted to the geographically determined fur trade, and distinguished by the name of *côte*. A *côte* consisted of a single line of cabins and clearings, three or four miles long, facing the river along which they were ranged. One *côte* ran into the next, with often only a roadside cross to mark the boundary; and these riparian villages lined the main water-courses of French Canada, especially the St. Lawrence, whose shores from Quebec to Montreal at an early date presented the appearance of a single street.

The river was the King's highway. Here were concentrated the crude activities of the pioneer colony. Here passed the stately ship from France with its cargo of merchandise and wives for the colonists, the boat of the *habitant* farmer with its stock of onions and grain and meat for the Quebec market, the birchbark canoe of the rollicking, devil-may-care voyageur with his winter's hunt of furs, the war fleet of the invading Iroquois on their mission of death, and the smooth-gliding skiff of the curé, paddling along from house to house on his mission of mercy. Every dwelling of every village of Canada, therefore, had to face the river. Hence land along the water-course was at a premium, while good soil only two miles back was to be had for the taking. The original grants measured generally 766 feet in width and 7,660 in depth inland, but when bequeathed from generation to generation were divided up along lines running back at right angles to the all-im-

portant waterway. Hence each farm was long and narrow, measuring its precious river-front by the foot and its depth by the mile; while the dwellings were ranged side by side in cosy neighbourliness. Geographic control was despotic. A few model inland villages which were laid out in the vicinity of Quebec and especially encouraged by the Government proved abortive. The long-drawn-out *côtes* made ecclesiastical and political control, as well as defense against the Indians, difficult; but repeated orders from Louis XIV. to concentrate the inhabitants into compact groups availed nought.

These riparian villages, products of a remote fur-trading past, with their pure French-speaking population and the manners and institutions of another country and another age, survive to-day almost intact on the isolated north shore of the Lower St. Lawrence. Just below Quebec begins the long cordon—Beauport, Montmorency, L'Ange-Gardien, Château Richer, Beaupré, and St. Joachim, one running into the other with no visible dividing line. The houses are usually on only one side of the road, because the highway bisects the land of each dwelling, running across the grain of the farm-holdings. These begin in the salt meadows of the tidal marshes, for the tide is very noticeable here three hundred and sixty miles above the river's mouth; they extend back at right angles from the shore across the fertile intervalles and the terraced uplands to the wooded hills behind. Along this part of the St. Lawrence they are generally about six hundred feet wide by six thousand deep; but often the depth is greater, and the subdivision of estates by successive inheritances, according to the French law, has often narrowed the farm to less than a hundred feet. The long, attenuated fields are separated by wooden fences, running back from the river. The consequence is that one looking down from the bluffs above upon the minutely subdivided intervalle is forcibly reminded of the pens in great stockyards; and the successive lines of fences, seen in perspective, present the appearance of a board floor covering the bottom-land.

Every topographical division of the country, from the great stream that pours its brackish flood along the centre of the valley to the rough highlands walling the northern horizon, has its distinct use and value. The river-front of each farm gives access to this historic highway, and confers valuable fishing rights. The wide salt meadows in the tidal flats yield an abundant crop of hay, which is an important factor in the long winter feeding of the stock. The rich bottom-lands above the reach of the tide and

never exposed to the danger of inundation, because of Lake Ontario's regulating control over the flow of the St. Lawrence, are devoted to field agriculture and gardens. The bluff-bound upland which marks the limit of the old flood-plain of ages past affords rolling pasture-lands for horses, cattle and sheep; while the wooded hills beyond, up whose slope the land-holdings extend, furnish in abundance lumber for building and cordwood to feed the voracious stoves through seven months of bleakest winter.

Each village is four or five miles long, and varies in population from the 853 souls of St. Joachim to the 1,934 of Ste. Anne de Beaupré, where the crowds of pilgrims attracted yearly to a famous miracle-working shrine help to support the larger population. Beauport alone, which adds milling and lumber industry to its agricultural occupation, boasts the number of nearly seven thousand souls.

The proportions of the French-Canadian farms reappear in the shape of the counties along the north shore of the St. Lawrence between the Saguenay and Montreal. These territorial divisions are from ten to thirty miles wide along the river, but extend back at right angles for a hundred miles or more. Settlements are limited in general to the narrow river hem, while the vast interior is an uninhabited waste, where only the shanty of the lumbermen or the clubhouses of Canadian sportsmen shelter a transitory population for a short season each year. Why this is so an analysis of the geological and geographical conditions will explain.

That part of the province of Quebec lying north of the St. Lawrence is comprised almost wholly in the rough highlands of the Laurentian Mountains, an upheaved area composed chiefly of gneiss, granite, and other metamorphic rocks, highly crystallized, which yield the poorest possible material for soil. This unpromising sort of country borders the Lower St. Lawrence from the Atlantic to the Island of Orleans, rising above its placid flood in bold headlands sometimes two thousand feet high; but at Cape Tourmente, thirty miles below Quebec, the Laurentides gradually recede from the river and leave between themselves and the St. Lawrence a belt of low plain, which varies from two to six miles in width as far as Beauport, but above the city of Quebec spreads out to an average width of thirty miles as far as Montreal.

This plain is marked by a narrow outcropping of Lower Silurian limestones, those valuable sources of plant food. A superficial deposit of sand and clay dating from the last Glacial Epoch, together with the underlying rocks, constitute the elements forming a very fertile soil. Hence throughout the southern slope of the Lauren-

tides the distribution of settlements coincides with the outcappings of the limestones. These are the smiling oases in the rugged desert of granite and gneiss. In the stretch from Quebec to Montreal, where the St. Lawrence plain and the fertile belt grow broader, the riparian villages of the voyageur days have been supplemented by closely grouped inland settlements in their rear. This part of the St. Lawrence has, therefore, a productive hinterland.

With the long stretch of the lower stream conditions are quite different. From Quebec thirty miles to Cape Tourmente the limestone belt contracts to a thread; the plain forms a narrow hem along the river, with space for only the single line of village farms between the base of the Laurentides and the brackish flood of the mighty stream. Here is no stimulating back country with increasing demands, no room for expansion, no allurement for immigration. The two inland villages of St. Férol and St. Tite des Caps, lodged in a pocket of the mountains, do not invalidate the principle. They have nothing with which to buy and nothing to sell, except cordwood from the wide encasing forest.

But the Silurian limestone is not confined to the St. Lawrence plain. Thirty miles below Cape Tourmente, where the wooded rampart of the Laurentides abuts upon the river, limestone comes to the surface again in the Gouffre valley. It forms a belt about two miles wide at the mouth of the Gouffre, and can be traced for ten miles up this little tributary. Hence the Gouffre valley has its line of farms from Bay St. Paul on the St. Lawrence, with a population of fourteen hundred, to the parish of St. Urbain, with twelve hundred inhabitants, ten miles up the stream. Some three or four miles below the Gouffre, limestones appear again, bordering the St. Lawrence for about fifteen miles in a slender band never over a mile wide, along which we find the rather populous parish of Les Eboulements. After an interval of five miles the same rocks appear yet again just above the village of St. Irénée, border the St. Lawrence for about six miles, and extend up the valley of the Malbaie River for the same distance in a gradually narrowing band. At the mouth of this stream we find the long-drawn-out riparian settlements of Pointe-au-Pic, Murray Bay, and Cap à L'Aigle; while a goodly sprinkling of farms traces the outcapping of the limestone six miles up the valley to the village of Ste. Agnès, beyond which this soil-making stratum disappears.

The north shore of the St. Lawrence in the forty-mile stretch between the Malbaie River and the Saguenay harbors only two small villages, St. Fidèle and St. Siméon, with a pure French

population of about a thousand souls each; but in regard to their geological conditions no data are to be had, since the Geological Survey of Canada has published no report on this section. The mouth of the Saguenay is marked by the little village of Tadoussac, lodged on a shelf of glacier-worn granite. This settlement owed its origin, three hundred years ago, to its location on the main river route to the Hudson Bay country and the fur trade which it long commanded; but now its five hundred inhabitants earn a precarious living by fishing and rendering services to guests at a big summer hotel.

The limestones not only determine the fertile spots of this otherwise barren Laurentian district; they also furnish the chief building material for these north-shore villages. One sees here the dark gray stone predominating even over the abundant woods of the adjacent forests in the construction of the French-Canadian homes and churches. The bituminous element in the rock aids in burning it into lime, of which the villages have an abundant supply at their doors for making mortar and whitening walls.

The topography of the north shore of the St. Lawrence renders land communication difficult. In the early colonial days the river, as we have seen, was the chief highway, and this function it still performs for all points on this shore below Cape Tourmente. The flat intervalle of the St. Lawrence from Quebec thirty miles to St. Joachim has been utilized for a railroad. An excellent highway also connects the two points and continues a few miles beyond over the fertile meadows almost to Cape Tourmente. From St. Joachim a poor and difficult road leads over Cape Tourmente (1,919 feet) and the intervening highlands to Bay St. Paul, a road so poor that we were advised by the natives not to try it at all, or to allow at least two days for the drive of thirty miles. The Canadian horses are excellent and are trained to hard work, so the element of time necessary must be attributed to the state of the road. A road of like character—poor as any almost uninhabited and unproductive mountain country would necessitate—leads east to Murray Bay; but here land communication practically ends. To be sure, highways are laid down further east on Canadian maps; but one who has been in this country questions their character. The villages below Cape Tourmente depend upon river steamers while navigation is open, and acquiesce in isolation during the five months when it is closed.

The rugged, unproductive character of the hinterland, the very limited area of fertile soil to be found along the river, the general

meagreness of natural resources, and the repelling effects of a harsh climate have prevented these north-shore villages from intercepting the large foreign immigration entering the country by the St. Lawrence highway. This part of French Canada is a mere transit land, a character which has been accentuated in recent years, since the deepening of the river channel above Quebec has removed the chief port of entry upstream to Montreal. Thus the Lower St. Lawrence has been further isolated. The great attraction for new settlers lies in the vast, fertile interior reaching from Lake Ontario to the foot of the Rockies. The result has been a very limited immigration ever since 1763, when Canada became a British colony. The influx of English which followed the conquest, and of American loyalists after the Revolution, sought the upper St. Lawrence and the Province of Ontario. The objections to the lower province were twofold; geographical and racial—the severe climate and limited arable area on the one hand, and the religion, customs, and foreign speech of the French-Canadians on the other. Hence a vague linguistic boundary crosses the St. Lawrence valley a little above Montreal, but below Quebec the line of speech is absolute. It runs like a scar across the body politic of Canada, and at times the old wound burns, as the statesmen of Canada know. Such lines of race cleavage are familiar enough in the old world, where nations like Russia and Austria are often mosaics of races, but rare in our young Western continent, and in the United States quite lacking, because such graftings were made in our youth, and the scars have healed over and disappeared. French Canada was comparatively mature, as colonies go, when England took it; and the conservatism of its age and of a race peculiarly tenacious of its language has been strengthened by geographic isolation.

In the north-shore villages, except in the watering-place of Murray Bay, it is difficult to find any one who can speak a word of English, with the possible exception of the priests. In the counties of Quebec, Montmorency, and Charlevoix the immigration between 1851 and 1901 has been amazingly small, especially in view of the enormous immigration into Canada since 1880. Charlevoix County in this period has gained only thirty-seven citizens from extra-Canadian territory; Montmorency County, likewise thirty-seven; and Quebec County, exclusive of the City of Quebec, only 264, despite the fact that it contains the one great port of the Lower St. Lawrence. Out of this total of 338 for the three counties, 127 of the immigrants have come from the United States.

One who is familiar with the recent activity of colonization and repatriation societies in Canada is inclined to suspect that these immigrants from the United States are chiefly returned French-Canadians, who have come back to spend their last years in their native villages, living on the competence they have earned in New England mills and shops. The other aliens have come chiefly from the British Isles, especially Ireland, and from Belgium and France. The attraction of identical language or religion is here manifested.

While immigration has been reduced to a minimum by the combined influences of race differences and geographical environment, the latter has been the chief factor in producing a stationary population in these counties, in spite of the very prolific character of the French-Canadian people. Twelve or thirteen children to one married pair are a commonplace, and the number not infrequently runs up into the twenties. In the north-shore villages the number of individuals to a family ranges from 5.44 in Château Richer to 6.35 in Beauport; but these figures do not include the absent members of the household who have emigrated to the United States or the alluring farm lands of the great Canadian Northwest. In spite of this natural increase, the County of Montmorency has had a practically stationary population for the past three decades; the figures have risen from 12,085 in 1871 to only 12,311 in 1901. The County of Quebec has gained only twenty-five hundred in this interval (19,607 and 22,101), and Charlevoix thirty-seven hundred (15,611 and 19,334), though in the last decade its population also has been very nearly stationary. It seems to have reached the limit of subsistence. The redundant population from all these and many other French-Canadian counties with similar geographic conditions has emigrated to the United States and western Canada.

Under the economic methods of the *habitant*, as the French-Canadian farmer is called, the limit of subsistence is soon reached. Exclusion from the tide of emigration and of new ideas has produced on the Lower St. Lawrence an area of retarded economic development. The activities of life run along in the groove of the seventeenth century. After nearly three hundred years of settlement the occupations are those of a new country in the first stages of economic development. The forests of the Laurentian Mountains, the pastures covering the first terraces of the upland, and the low intervale fields along the river absorb the energy of the population. As one walks along the endless village street from Quebec to Cape Tourmente he sees below him the fields of barley, oats, and hay in

the long, narrow divisions which make up the *habitant* holdings; on the gently sloping terrace stretching a mile or two away to the foothills, the sheep, cattle, and horses of the *habitant* grazing; and beyond, where a road leads down from the dark forested hills which frame this picture, he sees the lines of lumbering ox-carts of quaint European shape with their loads of firewood for the farms below, while every considerable stream from the remote interior bears along its edges the marks of the lumber-drive in the stranded logs along its banks, or at its mouth the saw-mill with its piles of lumber and the boats laden with finished boards. At long intervals he passes a small shop with its limited array of tinware, lamps, and general merchandise, but beyond this sees little suggestion of buying and selling. Mercantile activity is practically *nil*.

Agriculture is the chief occupation of the people, but the system practised in French Canada belongs to the distant past. The *habitant* makes no effort to improve his methods, but with inbred conservatism adheres to those of his fathers. There is no rotation of crops, so that even the rich alluvium of the St. Lawrence bottom-lands is exhausted. A traveller writing as late as 1837 said that manure from the stables was carted onto the river ice in winter, to be carried away when the floes should break up and thus disposed of as a nuisance. Even to-day this valuable source of plant food is not adequately used; while artificial fertilizers and the plowing-in of enriching crops are measures beyond the ken of the ignorant, unenterprising *habitant*. Instead, he takes his grain annually to the church for blessing, and solicits the incantations of the priests over potato-bugs and grasshoppers. But this is not scientific agriculture. The Provincial Government of Quebec is trying to enlighten the farmer and to introduce instruction in the better cultivation of the soil in the schools and colleges; but education is wholly in the hands of the priests, and an excellent book on the principles of agriculture which had been recommended for use recently in one of the leading institutions of the Province was rejected on the ground that the text contained no allusion to the Virgin Mary. This episode would indicate a confusion in the minds of the educators themselves as to the respective spheres of agriculture and religion, and therefore meagre ability to instruct. Hence the *habitant* pursues his old way, putting most of his land in hay, because that crop is exempt from the Church tithes, showing thereby at least a limited insight into the relation of agriculture and religion, while he reaps his small fields

of tithe-yielding grain with old-fashioned scythe and cradle. Horse-rakes used in those heretical hayfields were the only indication we saw of modern agricultural implements.

The economic ideal of the *habitant* is to make his little farm suffice for all the needs of the family. This ideal, which is approximated in the river settlements, is absolutely attained in a few inland villages like St. Férol, where even the four miles stretch back from the river has put the final touch to isolation and hence to a primitive economy. This means that the *habitant* is independent of a great many things which most people consider essentials. But his fields raise the crops which must be stored away as supplies for the long winter feeding of his stock and the breadstuffs for the use of his family. The garden, generally cultivated by the women of the family, produces the various vegetables which will ripen in the short, hot summer, especially the peas and beans which fill the winter larder. The farmer raises and cures his own tobacco, makes much of his sugar from the sap of the maple trees which abound, so that crushed maple sugar with rich cream is one of the delicacies the hungry tramp looks for on the *habitant* table. The long, cold winter must have one more solace, so the *habitant* often distills his own "whiskey blanc"—the name suggests the moonshine product of the southern Appalachians—which circulates pretty freely throughout the Province of Quebec. Just before Christmas he does the butchering which supplies his family with meat for six months. He salts his pork; the fresh meat, being dressed and frozen, is thus preserved on the shelves of an outer room or in boxes and barrels filled with snow. A cold storage plant is easily achieved on the Lower St. Lawrence in winter. This domestic butchering explains the absence of meat shops even in a village like Beauport, with a population of 6,800 souls.

The larder being filled, the French-Canadian family during the long winter make up certain raw products of the farm. The *habitant* wife engages in a wide range of activities. All the ordinary household duties fall to her share, and in summer at least she keeps her house remarkably clean. All day Saturday, in the warm season, the sound of the scrubbing brush is heard in the land, as the trumper along the village highway can testify. On other days, by afternoon, almost every window frames the plain but gentle face of a woman, and the regular uplift of her hand, together with the murmurous hum of the wheel, reveals her occupation. The product of the flax fields she spins and weaves into the firm, coarse

linen which the traveller knows as the sheets covering the hay mattress of his bed. Towelling, also, she makes. The wool from the sheep on the farm she weaves into the strong gray homespun cloth of which the clothes of the men are made, and into the light linsey-woolsey for herself and daughters. Occasionally, when the pressure of work is great, the wool made ready for the loom she sends to the village weaver, or more rarely still to one of the mills of Quebec. She spins the yarn for the socks and stockings which she is eternally knitting for her numerous household, weaves rag carpet or "catalan," as it is locally called, dries rushes, which she braids into straw hats for her family, and even finds time to crochet narrow linen or cotton lace for the chief touch of adornment which the costume of the *habitant* woman knows. In many or all of these activities she is aided by her daughters as these grow up, for children are early trained to industry; a housewife who has several grown daughters can show a storeroom whose resources in the immense rolls of catalan, sheeting, and homespun blankets would surprise the uninitiated. From these supplies each daughter will draw her *dot*.

The farmer's outer garment in winter is a long homespun coat with a capuchin or hood to protect the head in stormy weather. A scarlet sash with tasselled ends wound round his waist, and a long bright knitted capote on his head, with the point hanging down behind, make him a picturesque figure in the snowy landscape. So much of his costume recalls the peasant dress in northwestern France to-day; but on his feet the "beefskin" moccasins, or *bottes sauvages* or *bottes Indiennes*, give the touch of the new-world savage wilderness, now also antiquated. The *habitant*, like the Indian, is his own shoemaker. His boots are moccasins modified by a top of calf or sheep skin coming nearly to the knee, as protection against the snow. The soles are of cowhide, turned up all around to form the sides, as in a moccasin. Even when an evident factory product is seen on the foot of the *habitant*, the design of the shoe is that of the "beefskin" moccasin with the possible addition of a low heel, not only as a concession to the conservatism of the *habitant*, but because the foot, accustomed to the yielding shape of the moccasin, can ill endure the restraint of the modern shoe.

The division of the seasons in this northeastern Canada makes the short growing period of the warm, bright summer a busy one for the *habitant*; much work has to be crowded into a few months, while the long winter is marked by plenty of leisure on the farm.

But these days are not idle ones. The *habitant* must feed his stock, which must be housed for months on account of the cold, thresh the grain for the family use, and keep his sledge always on the road from his wood lot in the mountains to supply fuel for the capacious stoves.

The French-Canadian farmer is a skilful mechanic. He makes his own hay-carts and rakes, his own furniture, and builds his own house after the quaint Norman model which his ancestors brought with them from western France nearly three centuries ago. He used the material at hand—limestone, coarsely mortared, or logs from the abundant forests, neatly squared and made tight with plaster. The houses are small, compact cottages, with dormer windows piercing the steep, sloping roof, which curves slightly upward at the projecting eaves. A narrow porch, generally without a balustrade, runs across the front three feet from the ground, and on this open the casement windows with their suggestion of old-world architecture. The interiors are simple in the extreme. The front room is generally the kitchen and the living-room combined. The walls, ceiled with unvarnished wood mellowed to a rich brown, and the exposed rafters lend a picturesque effect. The big two-story cooking stove, set in an opening in a partition wall, serves its own purpose in the kitchen and heats the apartment behind. The room contains also a tall clock with the date of a past century on its face, a cupboard for china, a dining-table, a few chairs, whose backs are polished by the touch of generations of hands, and a low, wooden cradle for the never failing *habitant* baby. The walls boast only a crucifix and a coloured print of Ste. Anne or St. John the Baptist, favorite saints in this devout community. Small sleeping-rooms open out of this kitchen, their privacy secured only by chintz or homespun curtains; for, as a rule, there are no doors. The beds are plain four-posters, hung with curtains, or occasionally are built in the wall, as one still sees them in certain peasant communities of Europe. Baking is done out of doors, winter and summer, in a large cone-shaped oven built of stone and mortar, with a platform in front and a rude shelter overhead. Every house has also its outdoor cellar, which is usually a shallow cave hollowed out of the adjacent limestone bluff, and provided with a lattice door.

The whole region, in its economic arrangements, seems an echo from a remote past. It still lingers in the seventeenth century. There is no division of labor, no artisans, no shop except that of the blacksmith, who is also still the wheelwright, no stores except

for the sale of tin and hardware and the few articles the *habitant* cannot make himself. Except at Ste. Anne de Beaupré, whose shrine attracts thousands of pilgrims, the inn is not differentiated from any other house of the village, but it is simply the largest house, because this alone may have the spare room to accommodate strangers. The only manufacturing industries in these north-shore counties of the Lower St. Lawrence are the making of butter and cheese and of various log products. Both indicate the mere beginning of higher economic development—the utilization of the natural forests on the mountains and of the rolling pasture lands on the terraces at their base. The great simplicity of the *habitant* home, the absence here of the tawdry decorations which disfigure the houses of the working class in the States, suggests great remoteness from the big factories which turn out vast quantities of cheap, inartistic bric-a-brac and furnishings. Hither penetrates no echo from the modern industrial system of the eager money-making present outside.

The *habitant* speaks a French which has been the subject of much discussion, but its peculiarities can be explained on the theory that it is a survival from a remote period and from old local conditions which have been preserved by isolation. The *habitant* has retained words which were in current use when the first settlers sailed from Normandy, but which in France meanwhile have changed their meaning or become obsolete. His ancestors came from the maritime provinces of western France, and their phraseology reflected the prevailing activities of seafaring life. This phraseology was aptly transferred to life in the *côte*, where intercourse, transportation, commerce, and the all-absorbing occupation of the fur-trader demanded for life on the river the general order of terms which had described activity on the larger highway of the sea. Hence sailors' phrases still survive in the *habitant's* every-day conversation, as when he speaks of "mooring" his horse to his sleigh, or when he "disembarks" from this vehicle with his "freight." In parishes far down the estuary, where fishing is still the chief occupation, the *habitant* gets married "at the herring," baptizes his child "at the capelan," and does something else "at the squid"; for the periods when these fish reach the shore to spawn are epochs with him. The French language of Lower Canada, furthermore, includes many terms never heard in France, because the early settlers had to invent a terminology for phenomena unknown in the mother country. Hence they adapted old words to new uses to indicate snow-shoeing, canoeing, portaging, driving logs, and mak-

ing maple sugar; or they adopted Indian names for certain birds, fish, and fruits which were strange to them. More recently, new inventions or institutions, such as the railroad, have forced upon the *habitant* English words whose French equivalent he has never heard. Beyond these verbal differences a harsher, coarser accent distinguishes his speech from the language of France.

Altogether the *habitant* is the only historical figure in North America; he alone carries about him the picturesqueness of a remote past. This quality is not confined to his house and clothes, to his quaint high cart and his low-running "burleau" or sleigh with its towering dashboard; it belongs also to his mind and his manners. It pervades his old-world leisurely courtesy, which has all the charm of a mellow civilization. It speaks from his simple contentment, his quiet, unremitting industry, his satisfaction in being and doing rather than having, his quiet enjoyment of the attainment rather than the pursuit of happiness. It rings out on the calm evening air in the sound of the fiddle or mouth organ that issues from his cottage door, or in the gay French *chanson* which he lustily sings as he drives along the highway in his two-wheel gig. But most eloquently it speaks in his attitude of reverence, his head bowed over his rosary, while he ascends the *scala-santa* step by step on his knees at the shrine of Ste. Anne. And here in this ancient seigneurie of Beaupré is the Lourdes of America, a miracle-working shrine maintained on a truly great scale, attracting pilgrims by the hundred thousand from all parts of the continent, bearing its stamp of the old land and the old age of faith here in the land and age of reason. It is safe to say that nowhere else in the domain of Anglo-Saxon America could this monument to mediæval Catholicism have survived.

The *habitant* is intensely conservative, strongly attached to the traditions of his fathers, his country, and his Church. In development, therefore, he has remained tied to a post while the rest of the world has moved on. It is the flag of France which he raises before his cottage on Sundays and saints' days; the allegiance of his heart is still that of a century and a half ago. His education, wholly in the hands of the Church, has little that answers to modern requirements or modern ideas. The *habitant* is very ignorant and satisfied. Reform, development, improvement find no place in his conversation. All his interest and activity in the politics of his country centre about the maintenance of the old. But he is a good citizen, industrious, law-abiding. His amusements are innocent ones. He is a gregarious creature, cheerful, and full of the social gaiety of

his race. The long winter evenings are frequently the occasions of family gatherings or of larger parties which take in a whole neighborhood. No matter how cold the night or how long the drive, the *habitant* faces both to indulge his social instinct. The evening is spent in old-fashioned games, in music or cards, seldom dancing. That distinguishes a wedding, and is limited to quadrilles, reels and jigs, for the priests will not allow more. The most striking figure of the entertainment is the fiddler, the national historical character whom France gave to the New World, and who can be traced in the early annals of this country from the St. Lawrence settlements down through the fur stations on the Great Lakes, the Wisconsin and Illinois Rivers, through the fortified trading-posts on the Ohio and the Mississippi, and, farther still, among the trappers' camps on the upper Missouri. On the western rivers he has passed into tradition, but on the Lower St. Lawrence to-day he flourishes still, and at the wedding festivities uses the technique and plays the repertoire which have come down to him from a long line of fiddlers. He sits on a high seat or table and "calls off" the figures, while the *habitant* youths and maidens go through the quaint dances of their forefathers.

Old in his mind, old in his manners, old in his activities, old in his faith—that is the *habitant*.

THE PAN-AMERICAN RAILWAY.

(MAP, p. 512.)

The accompanying map is based upon the larger map in the Report of Charles M. Pepper, United States and Pan-American Railway Commissioner, showing the proposed route of the Pan-American Railway, and the routes of the branch roads which will connect the trunk line with many important points to the east and west of it. The Report, dated March 12th, 1904, gives the results of the Commissioner's visit in 1903 to all the Latin republics on the North American mainland, and to the republics of Brazil, Uruguay, Argentina, Chile, Bolivia, Peru, and Ecuador for the purpose of gathering facts and giving publicity to the conditions that are likely to encourage private capital to utilize the inducements for railroad-building offered by the various republics.

The Commissioner found that since the Second International

Conference of American States, held in the City of Mexico in the winter of 1901-2, in relation to the Pan-American Railway, a number of favourable circumstances have combined to give substantial support to the Intercontinental Railway project, and to show that genuine progress is being made. He mentions the following among these events:

1. Actual construction work on railroads in Mexico south to the border of Guatemala, and from the terminus of the present system of railroads in the Argentine Republic north to the frontier of Bolivia and beyond, thus closing the sections which were open when the survey of the Intercontinental Railway Commission was made from the northern limit of Guatemala to the southern boundary of Bolivia.
2. The marked advance among the various countries in determining disputed boundaries and settling other questions at issue, by this means eliminating causes of friction which retarded railway communication among them.
3. The passage of the law by the Congress of Chile providing for the construction of the Trans-Andean line, which will give the Atlantic and Pacific coasts through-rail communication.
4. The legislation proposed by several of the republics, and in some cases, as in Peru, already adopted, with the view of establishing guarantee funds and other elements of permanent railway policy.
5. The definite conclusion of the question of the Isthmian Canal and the measures which insure the early construction of this international waterway.

The decision of the Mexican Government to prolong its lines to the frontier of Guatemala will have a very favourable influence on the commerce of the United States and Mexico, and in its effect on the republics of Central America by the encouragement to inter-communication which is thus given. For several years the Mexican lines south remained stationary, and while this was the condition there was little inducement to construct the intercontinental links through Guatemala and the other Central American countries. The concession granted for building a railway which would continue the present system to the borders of Guatemala was almost contemporaneous with the meeting of the Second Conference in the City of Mexico.

When Mexico was taking steps to prolong its lines to its southern borders the Argentine Republic was carrying to completion long-considered plans for extending its system to Bolivia and northward,

so that ultimately Buenos Aires will be connected with Lima, in Peru. For years the railroads of the Argentine Republic had their terminus at the town of Jujuy, 178 miles from the southern limit of Bolivia. Until these lines reached Bolivia incentive was lacking in that Republic to construct railroads which would form part of the Intercontinental system north and south. Since the Second Conference closed its sessions the Argentine Republic has taken measures to prolong the railways not only to the border, but beyond, into Bolivian territory, under the terms of the convention between the two countries. The road is now being constructed. This is of unusual importance to the Argentine Republic, Uruguay, Bolivia, and Peru.

Mr. Pepper says that the delimitation of disputed boundaries and the settlement by diplomatic negotiations or by arbitration of various controversies have prepared the way for closer communication, which was not wanted as long as the sovereignty of territory was undetermined. Among these agreements are the arbitration of the limits of the Argentine Republic and Chile in the Cordilleras; the convention recently signed by Peru and Ecuador for the arbitration of the disputed territory in the Napo River region; and the treaty between Brazil and Bolivia, under which the boundaries of the Acre rubber-producing territory are determined, and a beneficial impulse is given to railway-building in the Amazonian interior of South America. All the boundary and similar controversies are not yet terminated, but the progress made and the friendly spirit shown by the interested nations justify the belief that those yet undetermined will form no barrier to the policy of railway inter-communication which now is strongly favoured by all the republics.

The Trans-Andean Railway law passed by the Chilean Congress, and the matured plans of the Government for carrying out that legislation, which will make possible the through-rail journey from Valparaiso to Buenos Aires, may be taken as significant of the feeling of international friendship now so pronounced, and also of the appreciation of the advantages of extending commerce. The project itself is likely to be completed within five years at the longest, so that the Andes will be pierced and the transverse line of railway communication, which from its nature will feed the Intercontinental system, will be fully established.

Very practicable measures have been adopted to meet deficiencies in existing laws, and to furnish both inducement and security to capital invested in railroad-building. This is notably the case in the Republics of Peru and Bolivia. The Peruvian law, which was

enacted in February of the present year, creates and sets aside a special revenue as a permanent fund for guaranteeing capital invested in railway construction of specified routes that have for their purpose the internal development of the country, and especially of lines that will be part of the Intercontinental system. The legislation is significant of the progressive policy of the Peruvian Government.

Bolivia receives a cash indemnity of approximately \$10,000,000 gold from Brazil, under the treaty for the settlement of the Acre dispute. This money is to be applied to railway construction, and it is the announced policy of the Bolivian Government to use the fund as the basis for further railway credit. This assures the building of the sections that are lacking in the Intercontinental route, for the preference is given to these sections.

Mr. Pepper's report enlarges upon the beneficial influence which the Panama Canal will exert upon the building of railroads in the Latin republics and its consequent value as a factor in the development of the Pan-American Railway.

The Commissioner comments upon the great value of the Intercontinental survey for the railroad made by the various engineering corps during the years 1892-1896:

The conclusions of the engineers have been accepted quite generally. Their pioneer labors have formed the bases, heretofore unattainable, for a comprehensive study of railway development in Central and South America, and have been of special benefit in various exploitation enterprises collateral to railway building, the success of which would be dependent on means of communication. They have also formed the groundwork for further studies by geographical societies, scientific commissions, government engineers, and individuals. One outcome of this discussion has been the suggestion of variations in the tentative locations and alternative routes which might result in shortening some of the proposed sections, thus reducing materially the estimated cost of construction.

An illustration is found in the use made of the studies and locations of the engineering corps for the actual building of links in the general Pan-American system. This, notably, has been shown in the line from Oroya to Cerro de Pasco, in Peru, recently finished, which forms a direct section in the Intercontinental Project. It also has been shown in the extension of the Guatemala Central Railroad, opened to traffic in November, 1903, which likewise forms a part of the Pan-American plan, and promises to be extended along the route of the survey to Ayutla on the Mexican border within a short time.

The length of the Intercontinental route, as estimated by Capt. E. Z. Steever, of the Engineer Corps, in 1896, is 10,471 miles between New York and Buenos Aires. He found that 6,702 miles were already in operation, leaving 3,769 miles to be constructed. Since then about 460 miles have been built along the line, leaving

3,309 miles to be carried out, unless the route is slightly changed to shorten the distance.

The Pan-American line presents no engineering difficulties greater than those which have been met and surmounted in lines constructed, such as the railway from Callao to Oroya, with its infinity of grades, curves, bridges, viaducts, tunnels, and switch-backs, or in the Guayaquil and Quito Railroad, as well as on several Mexican roads. The questions of a practical nature are the cost of overcoming these obstacles and the ability of the various Governments to supply the deficiency where the prospective traffic does not afford sufficient inducement to private enterprise. These questions are answered in the purpose of the Chilean Government to bore a tunnel through the Andes, in the action of the Argentine Republic in building a northern extension through the Quebrada of Humahuaca into Bolivia, in the policy of the Bolivian Government for the line connecting Tupiza and Uyuni, and in the plans of the Peruvian Government for closing the gap to Cuzco.

THE ESSENTIAL IN GEOGRAPHY.

Professor Wm. M. Davis, of Harvard University, was chairman of the Section of Geology and Geography at the meeting of the American Association for the Advancement of Science in St. Louis last winter. He addressed the Section on "Geography in the United States," and in the course of his remarks gave a definition of geography and outlined what he believed to be the essential features of the study. The following are extracts from this portion of Professor Davis's paper:

The essential in geography is a relation between the elements of terrestrial environment and the items of organic response; this being only a modernized extension of Ritter's view. Everything that involves such a relationship is to that extent geographic. Anything in which such a relationship is wanting is to that extent not geographic. The location of a manufacturing village at a point where a stream affords water-power is an example of the kind of relation that is meant, and if this example is accepted, then the reasonable principle of continuity will guide us to include under geography every other example in which the way that organic forms have of doing things is conditioned by their inorganic environment.

The organic part of geography must not be limited to man, because the time is now past when man was studied altogether apart from the other forms of life on the earth. The colonies of ants on our western deserts, with their burrows, their hills, their roads and their threshing floors, exhibit responses to elements of environment found in soil and climate as clearly as a manufacturing village exhibits a response to

water-power. The different coloration of the dorsal and ventral parts of fish is a response to the external illumination of our non-luminous earth. The word *arrive* is a persistent memorial of the importance long ago attached to a successful crossing of the shore-line that separates sea and land. It is not significant whether the relation and the elements that enter into it are of easy or difficult understanding, nor whether they are what we call important or unimportant, familiar or unfamiliar. The essential quality of geography is that it involves relations of things organic and inorganic; and the entire content of geography would include all such relations.

A large library would be required to hold a full statement of so broad a subject, but elementary text-books of geography may be made by selecting from the whole content such relations as are elementary, and serviceable handbooks may be made by selecting such relations as seem important from their frequency or their significance. The essential throughout would, however, still be a relation of earth and life, practically as Ritter phrased it when he took the important step of introducing the causal notion as a geographical principle.

Thus defined, geography has two chief divisions. Everything about the earth or any inorganic part of it, considered as an element of environment by which the organic inhabitants are conditioned, belongs under physical geography or physiography.* Every item in which the organic inhabitants of the earth—plant, animal, or man—show a response to the elements of environment, belongs under organic geography. Geography proper involves a consideration of relations in which the things that belong under its two divisions are involved.

The validity of these propositions may be illustrated by a concrete case. The location and growth of Memphis, Helena and Vicksburg are manifestly dependent on the places where the Mississippi River swings against the bluffs of the uplands on the east and west of its flood-plain. The mere existence and location of the cities, stated independent of their controlling environment, are empirical items of the organic part of geography, and these items fail to become truly geographic as long as they are stated without reference to their cause. The mere course of the Mississippi, independent of the organic consequences which it controls, is an empirical element of the inorganic part of geography, but it fails to become truly geographic as long as it is treated alone. The two kinds of facts must be combined in order to gain the real geographic flavor.

Geography is therefore not simply a description of places; it is not simply an account of the earth *and* of its inhabitants, each described independent of the other; it involves a relation of some element of physical geography to some item of organic geography, and nothing from which this relation is absent possesses the essential quality of geographical discipline. The location of a cape or of a city is an elementary fact which may be built up with other facts into a relation of full geographic meaning; but taken alone it has about the same rank in geography that spelling has in language. A map has about the same place in geography that a dictionary has in literature. The mean annual temperature of a given station, and the occurrence of a certain plant in a certain locality, are facts of kinds that must enter extensively into the relationships with which geography deals; but these facts, standing alone, are wanting in the essential quality of mature geographical science. Not only so; many facts of these kinds may, when treated in other relations, enter into other sciences; for it is not so much the thing that is studied as the relation in which it is studied that determines the science to which it belongs.

* It should be noted that the British definition of physiography gives it a much wider meaning than is here indicated.

I therefore emphasize again the broad general principle that mature scientific geography is essentially concerned with the relations among its inorganic and organic elements; among the elements of physical and organic geography.

There can be no just complaint of narrowness in a science that has charge of all the relations among the elements of terrestrial environment and the items of organic response. Indeed, the criticism usually made upon the subject thus defined is, as has already been pointed out, that it is too broad, too vaguely limited, and too much concerned with all sorts of things to have sufficient unity and coherence for a real science. Some persons, indeed, object that geography has no right to existence as a separate science; that it is chiefly a compound of parts of other sciences; but if it be defined as concerned with the relationships that have been thus specified, these objections have little force. It is true, indeed, that the things with which geography must deal are dealt with in other sciences as well, but this is also the case with astronomy, physics, chemistry, geology, botany, zoology, history, economics.

There is no subject of study whose facts are independent of all other subjects; not only are the same things studied under different sciences, but every science employs some of the methods and results of other sciences. The individuality of a science depends not on its having to do with things that are cared for by no other science, or on its employing methods that are used in no other science, but on its studying these things and employing these methods in order to gain its own well-defined object. Chemistry, for example, is concerned with the study of material substances in relation to their constitution, but it constantly and most properly employs physical and mathematical methods in reaching its ends. Botanists and zoologists are much interested in the chemical composition and physical action of plants and animals, because the facts of composition and action enter so largely into the understanding of plants and animals considered as living beings. Overlaps of the kind thus indicated are common enough, and geography as well as other sciences exhibits them in abundance. It may be that geography has a greater amount of overlapping than any other science; but no valid objection to its content can be made on that ground; the maximum of overlapping must occur in one science or another—there can be no discredit to the science on that account. Geography has to do with rocks whose origin is studied in geology; with the currents of the atmosphere, whose processes exemplify general laws that are studied in physics; with plants and animals, whose forms and manners of growth are the first care of the botanist and the zoologist; and with man, whose actions recorded in order of time occupy the historian; but the particular point of view from which the geographer studies all these things makes them as much his own property as they are the property of any one else.

In view of what has been said, let me return to the close scrutiny that I have urged as to what should be admitted within the walls of a geographical society. We will suppose the geography of Pennsylvania is under discussion; as a result there must be some mention of the occurrence of coal, because coal, now an element of inorganic environment, exerts a control over the distribution and the industries of the population of Pennsylvania. But the coal of Pennsylvania might be treated with equal appropriateness by a geologist, if its origin, its deformation and its erosion were considered as local elements in the history of the earth; by a chemist, if its composition were the first object of attention; by a botanist, if the ancient plants that produced the now inorganic coal-beds were studied. Furthermore, it would be eminently proper for the geologist to make some mention of the present uses to which coal is put; or for the chemist and the botanist to tell something of

the geological date when coal was formed, if by so doing the attention of the hearer could be better gained and held, and if the problem at issue could thereby be made clearer and more serviceable. So the geographer is warranted in touching upon the composition, the origin, the exploitation of the Pennsylvania coal-beds, if by so doing he makes a more forcible presentation of his own problem; but if he weakens the presentation of his own problem by the introduction of these unessential facts, still more if he presents these unessential facts as his prime interest, he goes too far. The point of all this is that students in many different sciences may have to consider in common certain aspects of the problems presented by the coal of Pennsylvania; but that each student should consider Pennsylvania coal in the way that best serves his own subject. The scrutiny that I have urged would, therefore, be directed chiefly to excluding from consideration under geography the non-geographic relations of many things that various sciences have to study in common, and to bringing forward in geography all the problems that are involved in relations of the earth and its inhabitants.

UNITED STATES GEOLOGICAL SURVEY:
BULLETIN NO. 225.

*Contributions to Economic Geology, 1903, by S. F. Emmons and
C. W. Hays, Geologists-in-Charge.*

This *Bulletin* represents the policy of publishing early each year a condensed review of the results of the Survey's investigations of the previous year. The papers exclude all purely scientific matters, and are thus fitted to give, at the earliest date, the information which the busy practical man needs concerning the development of our mineral resources. In some cases the brief treatment is all that is required, and in others it is preliminary to more full and formal publications which are to be made later.

Among the papers in this volume is an account by A. H. Brooks of Placer Mining in Alaska in 1903. While lode-mining is developing in the Territory, six-sevenths of Alaska's mineral product for the year was from placers. There is great need of improved communications. It costs \$5 per ton to land freight from steamers at Nome. A deep-water pier is much needed, but would be difficult to construct because of the great ice-floes, which are sometimes piled to a height of 100 feet on that shore. Lode-mining is practiced in southeastern Alaska, but the Seward Peninsula is still the centre of the more important mining operations, and \$20,000,000 in value have been taken from that region since 1899, and 100 miles of ditches are in operation on the Peninsula. Beach-mining

is nearly a thing of the past; while the annual output of the Alaskan Yukon is nearly \$1,000,000.

The tin deposits of the York region are discussed by Mr. Arthur J. Collier. Stream tin was found several years ago, and lode tin was discovered in 1903. Most of the ore is cassiterite, which is said to be irregularly distributed through an area of 450 square miles, occurring in placers and in lodes. Little has been done in the way of development. All the deposits are near tide-water, and deserve to be carefully investigated.

The Cumberland Gap coal field receives notice by Mr. George H. Ashley. The field belongs to the eastern edge of the Appalachian coal-belt of Kentucky and Tennessee. It has the Cumberland Range on the southeast and the Pine Mountains on the northwest. The drainage is by the Cumberland River through Pineville Gap. The rocks containing the coals are shales and sandstones, and structurally form a flat-bottomed syncline. In Log Mountains are at least forty coal beds, thirteen of them being thick enough for working. Most of the area is not yet tapped by railways, and only recently have roads been built to Middlesboro, which lies just outside the Cumberland Gap from the Great Valley. The product about that centre runs annually from 600,000 to 1,000,000 tons. With the notices of coal, as of many other products, is included a bibliography of the various papers upon the respective subjects published by the Geological Survey. This makes the *Bulletin* a convenient summary of the Survey's operations and a useful guide to its economic literature.

A. P. B.

GEOGRAPHICAL RECORD.

AMERICA.

A NEW HARBOUR IN PORTO RICO.—Mr. J. C. Landers, of the Coast and Geodetic Survey, describes another good harbour in Porto Rico, revealed by the work of the Survey. Although every good harbour in Porto Rico has, doubtless, been long known to fishermen and local traders, the cartographers knew nothing about Ensenada Honda, Jobos, or Guayanilla until the detailed hydrographic surveys of the Coast Survey were published. The harbour now added to the list is Boqueron Bay, which has just been surveyed. It is ten miles to the south of Mayaguez, and four miles north of Cabo Rojo, the southwestern point of Porto Rico.

The bay is an indentation in the coast, about two miles deep and two miles wide at the mouth. It is protected by a coral reef across the mouth, through which two passages lead into the harbour. The northernmost has a channel of over four fathoms, while the passage just south of the middle of the reef has a depth of six fathoms. Once inside, good holding-ground of not less than four fathoms is found over an area about $1\frac{1}{2}$ square miles. The water shoals towards the head of the bay, where the small town of Boqueron is situated. This forms the commercial outlet for the valley of the Borinquen River, and of the region as far back as the town of Lajas. This tributary region produces important quantities of sugar, molasses, and cocoanuts.

DELTA PLAINS OF THE NASHUA VALLEY, IN MASSACHUSETTS.—Rarely is an opportunity given to study the glacial geology of an area in such intimate detail as that supplied by the work of the Metropolitan Water Board of Boston, in its preliminary investigations on the site of the Wachusett Reservoir. In an area of 9,000 feet long and 2,000-3,000 feet wide, more than 1,131 borings were made to depths averaging 83 feet, and in some cases reaching nearly 300 feet. Altogether, 10,000 samples from these borings were collected. The records and samples, as well as the excavations, have been carefully studied by Professor Crosby, who has recently published a detailed report, describing the condition revealed and discussing the origin of the phenomena (*Technology Quarterly*, XVI, 1903, 240-254, and XVII, 1904, 37-75).

This paper is an important contribution to our knowledge of the internal structure of delta plains built along the margin of the receding ice-sheet; and both the description of the borings and photographs of sections revealed in the course of excavation give us a clear idea of the internal structure of these interesting topographic forms. As in other places, the surface of the delta plains is pitted by kettle-shaped depressions, some of which Crosby shows must certainly have been caused by the stranding of ice-blocks during the construction of the deltas.

R. S. T.

THE THOUSAND ISLAND REGION.—The peculiar condition at the outlet of Lake Ontario, where the St. Lawrence River sluggishly flows out between numerous islands with no single well-defined valley, has attracted the attention of physiographers, as its exquisite beauty has drawn to it streams of tourists and summer residents. A mere glance suffices to show the physiographer that it

is not a normal river valley, but a gently-undulating hilly surface flooded by the waters of Lake Ontario, which thread their way over numerous low divides before gathering into a single stream. Only since the glacial period has this region been occupied by a large river, which has not had time enough to settle down to a single channel and develop a valley for itself.

What the exact preglacial condition of this region was has never been determined. Therefore any contribution to the subject is of decided interest. A recent paper by Wilson (*Bull. Geol. Soc. Amer.*, XV, 1904, 211-242) calls attention to certain topographic features of the region which lead him to offer an interpretation of a part of the preglacial history. He points out that, although the River Trent flows by irregular course toward the southeast, while the St. Lawrence flows towards the northeast, there is, throughout the region from the Black River in New York to Sougog Lake in Canada, a general system of valleys extending toward the southwest. Certain sections of the Trent River are in these old valleys; while other sections are along lines of overflow between neighbouring valleys with southwest trend. The irregular Bay of Quinte is made by the union of nine of these streams by the rise of the Ontario waters; and three of the channels of the St. Lawrence overflow are along the lines of northeast-southwest valleys. Some of these valleys extend out under the lake waters, and their presence on the lake bottom is indicated by soundings. This system of streams is believed by the author to have formed a trunk river, now dismembered, which flowed westward, past Hamilton, Ontario, to the Erie lowland *via* the Dundas valley.

The author does not specifically attempt to solve the problem of the origin of Lake Ontario; but he brings forward evidence seeming to prove that ice erosion was not effective enough to cause the basin. If his southwest system of valleys is demonstrated, and if ice erosion is eliminated, it seems necessary to have recourse to differential land movements to account for the basin. This paper is a very decided contribution to the understanding of a complicated problem; and while numerous questions arise which it does not answer, it is undoubtedly an important step towards the solution of the problem.

R. S. T.

END OF THE MORRIS CANAL.—The famous Morris Canal in New Jersey has been practically condemned in a report to the Governor. The Commissioners say that even were the property in perfect

condition it could not be operated at a profit. Its decline in value is due to the powerful competition of railroads that carry freight at cheaper rates than can be done by canal boat. The result is that nearly all the traffic was diverted from the canal. At present the canal stands in the way of needed public improvements, and its abandonment is assured. The Canal Company, incorporated in 1824, built this waterway from Philipsburg on the Delaware River to Jersey City—a distance of 106 miles. It was leased in 1871 to the Lehigh Valley Railroad Company, which has since operated it.

EUROPE.

LIMNOLOGY IN EUROPE.—The *Geographical Journal* for August summarizes the laborious compilation of the results attained in Europe by the Lake surveys of recent years by Dr. W. Halbfass, in the *Zeitschrift* of the Berlin Geographical Society (1903, Nos. 8, 9, 10; 1904, No. 3). The work brings together, into small compass, a vast amount of data, and shows the exact state of our present knowledge of European lakes. No fewer than 873 lakes are included; but the gaps in our knowledge are still striking, especially as regards the lakes of northern Europe. The lakes in the Alpine countries are best known, though Sir John Murray's survey of British lakes will give that country a high place. Many Alpine lakes, however, require more detailed examination. Spain is not rich in lakes; but a considerable amount of work is to be done there, as is the case also in Greece. On the other hand, the examination of the lakes of the more northern part of the Balkan Peninsula is proceeding satisfactorily through the labours of Oestreich, Cvijic, and others.

At the close of his monograph, Dr. Halbfass groups into five tables the lakes which head the list in depth, volume, etc. Of 27 lakes which, as far as we know, have a depth of 200 metres (656 feet) and over, 14 (including the four deepest) belong to the Scandinavian Peninsula, 10 to the Alps or their borderlands, 2 to Scotland, and 1 to Macedonia. All the deep lakes of Europe lie either on the margin of important mountain ranges or in regions of geological subsidences, and almost all the deepest occupy depressions reaching below sea-level.

In Scotland and Norway many of the deepest lakes have their surfaces only a little above sea-level, and the difference between these and fiords is very slight. Of the high-level lakes (among which much work still remains to be done), the deepest thus far known seems to be Lac Bleu, in the Pyrenees (6,457 feet above

the sea), with a depth of 396 feet; but probably this may be exceeded in Norway. Both for volume and extent of shore-line Onega takes the first place, the Scandinavian lakes Wener and Mälär following next—the first in respect of volume, the second of shore-line, while Mälär shows the greatest proportional development of shore-line of all the European lakes. For steepness of sides, the Königs-See takes the highest place, Loch Katrine the second, among lakes which exceed 1 square kilometre in area.

THE HOUSE OF THE ROYAL GEOGRAPHICAL SOCIETY.—In his last address to the Royal Geographical Society, the President, Sir Clements R. Markham, said the work of the Society had so far increased during the past 30 years that the present premises were too small for its requirements. A handsome price had been offered for the present house, but in addition to that sum a far larger amount would be required to obtain a freehold site and erect a suitable building. Several sites had been offered, but the Council did not feel justified in taking further steps until most of the amount required (about \$600,000) is subscribed. Meantime a Special Committee is considering the question of increasing the accommodations.

POSITION OF GEOGRAPHY AT CAMBRIDGE.—The Cambridge authorities have decided to establish a Board of Geographical Studies to draw up a geographical course, take steps to procure a competent staff to cover the whole field of the science, and especially to train young University men for practical work in the field. The staff of the new Geographical School will consist of several lecturers and teachers. A diploma in geography will be granted, as at Oxford, and geography will be introduced into the examination for the B.A. degree.

LONDON FOGS.—At the request of the London County Council the Meteorological Council of the Royal Society, three years ago undertook an inquiry into London fogs during the winter of 1901-02, the results of which have been reported to the Meteorological Council by Captain A. Carpenter, who had charge of the investigation. The observations were made chiefly by officers of the Metropolitan Fire Brigade. The fog frequency on days of the week is shown in the following table:

Friday.....	163	Wednesday.....	139
Saturday.....	143	Tuesday.....	112
Sunday.....	143	Monday.....	87

The hours of the beginning of fog formation on 43 occasions were as follows:

Midnight to 1 A.M.....	3	9 A.M. to 10 A.M.....	2
5 A.M. to 6 A.M.....	8	5 P.M. to 10 P.M.....	7
7 A.M. to 8 A.M.....	23		

The London fogs were dispersed when the wind at Kew reached a velocity of 13 miles an hour, with the exception of the very smoky fogs which accompanied the damp air of advancing cyclones. These seemed to require a force of about 17 miles an hour to disperse them. The three causes of fog, according to Captain Carpenter, are (1) a warm atmosphere cooled by contact with a cold earth or water surface, which forms a cold surface fog; (2) a cold atmosphere warmed by contact with a warm earth or water surface, which forms a steaming water fog; (3) two strata of air of different temperatures in contact with one another, which conditions give rise to a cloud fog. Any of these fogs may become permeated by smoke. The fog particles become coated with oily hydro-carbons, are then impervious to the evaporating power of the sun, and may drift long distances, slowly settling on ground, houses, and clothes, and being inhaled by living animals and plants. (*Quart. Journ. Roy. Met. Soc.*, 1904, pp. 171-2.)

R. DEC. W.

CLIMATE AND CHARACTER IN SCOTLAND.—The général effect upon national temperament of the climatic conditions under which man lives has often been commented on. The sunny skies of southern Europe have doubtless had an influence upon the character of the people and of the literature of that region, just as the greater prevalence of cloud in the higher latitudes of the same continent has tended to give the inhabitants and the literature of the more northern lands some of their seriousness. This same note is struck in Sir Archibald Geikie's delightful *Scottish Reminiscences*, when the author speaks of the effect of Scotch topography and of Scotch climate upon the national life and character of the Highlander:

The gloom of the valleys is deepened by the canopy of cloud which, for so large a portion of the year, rests upon the mountain ridges and cuts off the light and heat of the sun. Hence his harvests are often thrown into late autumn, and in many a season his thin and scanty crops rot on the ground, leaving him face to face with starvation and an inclement winter. Under these adverse conditions he could hardly fail to become more or less subdued and grim.

R. DEC. W.

MAP OF THE BRITISH ORDNANCE SURVEY.—The colored 1-inch map of England which the Ordnance Survey is now publishing is a

vast improvement on the sheets of the earlier series, and is one of the best examples of modern topographic methods. Villages and roads are given in great detail, so that the sheets are excellent guides for local excursions. The sheets are of various sizes, the largest costing from 2 to 3 shillings. Slopes are shown by brown hachures, heights by red contours with hundred-feet intervals, the chief highways are in ochre, the water in blue, parks in green, and cultural features in black.

A NEW MAP OF FRANCE.—The present director of the Geographical Department of the French General Staff has planned a new map of France on a scale of 1:50,000, which will replace the map of France on a scale of 1:80,000. While in the old map the mountains are shown with hachures and only black is used, the new map will give relief features in contour lines, and several colours will be used to distinguish water, roads, and cultural features. The first sheets of the new map, which will present Paris and its surroundings, will be published about the end of the year.

AFRICA.

GLACIATED SURFACES AND DEPOSITS IN THE TRANSVAAL.—A proof sheet from the Geological Society of South Africa announces the discovery by E. T. Mellor of extensive glaciated surfaces and deposits 25 miles east of Pretoria. The deposits represent the lower portion of the Highveld Formation lying immediately below the Coal Measures, and consist of irregularly-alternating conglomerates, sandstones, and shales. The conglomerates have the characters usual in ground moraines. They are boulders, miscellaneous in composition and size, embedded in a clayey, or more frequently sandy matrix, full of smaller angular rock fragments. The boulders are polished, faceted, and those which are sufficiently fine in grain are frequently striated. The sandstones are also very irregular in thickness, often massive and without traces of bedding. The shales show fine lamination, very regular over short distances. These deposits were laid down upon a land surface of considerable variety, many features of which reappear with slight modification in the landscape of to-day. Whenever the glaciated deposits are removed by erosion glaciated surfaces are of frequent occurrence. The striae and boulders prove that the ice movement was N.N.W. to S.S.E. The wide extent of the glacial deposits, their presence at various elevations, and the parallelism and constancy of direction of the striae indicate a considerable thickness of the ice-sheet.
(*The Amer. Jour. of Sci.*, July, 1904, p. 89.)

DESICCATION OF LAKE CHAD.—Captain Lenfant, in the account of his journey by water from the mouth of the Niger to Lake Chad, recently published in *La Géographie* (BULLETIN, July, 1904, p. 429), says that Lake Chad can no longer be regarded as a vast inland sea, affording the means of brisk commercial activity between its shores. Year by year evaporation diminishes its limits, and on the border of Kanem, on the east, the islands seen by Overweg have become *terra firma*, while the sand banks spoken of by him have been transformed into islands, and the masses of floating herbage are in their turn taking the form of sand banks. Thus the traveller who stands on the old lake shore has before him three zones of islets in course of formation, ranged in regular lines and separated by channels, sometimes of great depth, and maintaining a uniform direction.

A similar phenomenon is to be noticed in the north; while in the south there are wide grass-covered banks broken by small expanses of open water. The town of Ngornu, found by Barth to be in course of rebuilding after it had been destroyed by an inundation from the lake, is now twenty miles from the shore. In the extreme east the Bahr-el-Ghazal is no longer connected with the lake, the intervening stretch having become a millet field of great fertility, thanks to the rich alluvium left by the waters.

These phenomena have curiously affected the work of the Anglo-German Boundary Commission, which has been engaged in surveying the country through which the frontier between Northern Nigeria (British) and the German hinterland of the Kamerun is to be drawn. The Commission have not been able to agree on the actual demarcation of the frontier line, because the members have different views as to where the actual shore of Lake Chad should be drawn (*Scot. Geog. Mag.*, 1904, No. 7, p. 377). The observations of the French have shown that the water of the lake is gradually receding from the eastern shore, which is fringed by an archipelago of islands, some of which are gradually becoming attached to the mainland. There is some evidence to show that simultaneously with this receding of the water there is a gradual advancement of the lake in a westerly direction. But apart from the question of any permanent shifting of the lake-bed to the west, it has been demonstrated that during the rainy season the waters of Lake Chad overflow the western shore to a breadth of some miles; and the contention of the German Commissioners is that the extreme limits of this flood-water must be regarded as the shore of the lake, while the British Commissioners assert that this flood-water cannot be regarded as a part of the lake proper.

CROSSING THE WESTERN SAHARA.—The Western Sahara between Algeria and Timbuktu has not been crossed by Europeans until recently since the days of Caillié, about 75 years ago. Several explorers have tried to cross this part of the desert, but failed. The fact that the region has again been traversed is one of the results of the French occupancy of the Tuat Oases. A military column under the command of Capt. Laperrine, at the end of May last, met an expedition travelling north from Timbuktu under the leadership of Capt. Thiévenaut at Timissâo in the heart of the desert about 22° N. Lat. These expeditions across the desert will doubtless be continued, particularly as France is planting a series of stations at the wells and in the oases. These stations are to be fitted with wireless telegraph plants, so that the French in the Sudan will no longer be dependent upon the British cable to Senegal.

SCIENTIFIC RESULTS OF THE FOUREAU MISSION.—The Paris Geographical Society has just issued, under the legacy of Renoust des Orgières, the first number of the "Documents Scientifiques de la Mission Saharienne," by F. Foureau, Chief of the Expedition. The volume is published very handsomely by Masson & Co. It contains the astronomical and meteorological observations of the expedition, and will be followed by reports on topography, geology, biology, ethnology, and archaeology. The accounts of the winds and thunder-storms and some other phenomena are especially minute. It is interesting to know that this legacy is to be applied to the aid of expeditions planned to bring the interior of Africa under the influence of France and make a homogeneous whole of her actual possessions in Algeria, Senegal, and the Congo.

THE CHEVALIER MISSION IN THE SHARI BASIN.—The expedition which left France in June, 1902, under Mr. August Chevalier, to continue the scientific study of the French Sudan between the Mobangi tributary of the Congo and Lake Chad, has returned to France after successfully carrying out its work. Mr. Chevalier has made a preliminary report, which is published in *La Géographie* (June, 1904).

The region is entirely included in the basin of the Shari River, excepting along its southern edge among the equatorial forests whose water-courses reach the Mobangi and the Congo. Midway on the journey near Fort Archambault, Chevalier met the Sara tribe, along the upper Shari, who impressed him as among the finest of African peoples. They are large and physically powerful,

many of the men measuring six feet in height; while the women are also tall and strong. He says these vigorous people are much superior to most other tribes. They are laborious tillers of the soil, are ignorant of cannibalism, and their social condition is well ordered and prosperous. Most of the land they cultivate has been wrested from the forest by cutting down the timber. The explorer believes the Sara will be especially useful in the development of the country.

The entire region traversed, except the forest belt in the south, belongs to the Sudan. Chevalier believes that the Sudanese Empire of France has a future of great importance. The people are superior to other blacks, and most of them may be regarded as occupying a plane of semi-civilization. They are docile, desirous of improving their condition, and nearly all are tillers of the land which they have conquered from the forests. They raise abundant crops, never suffer from famine, and are not addicted to cannibalism. They have suffered terribly from slave raiders, who have depopulated large regions. But they need only peace and protection to increase rapidly in numbers and in prosperity.

This central part of the Sudan may be divided into three zones: The narrow forest belt on the south, where the rubber industry is capable of large development, coffee grows wild, and the kola nut may be cultivated; the middle zone, which is the most populous and most interesting, a country covered with well-tilled fields (here the cultivation of cotton is destined to become a very large industry); and, finally, the steppes of the north, extending to the desert of Sahara, where the ostrich thrives, gum arabic may be obtained in large quantities, and large numbers of people may lead a pastoral life, as the land is well adapted for grazing. France has a great opportunity to turn this vast region into a prosperous colony.

A RAILROAD FROM BERBER ON THE NILE TO SUAKIN ON THE RED SEA.—The Egyptian budget for 1904 gives information with regard to the proposed railroad between Berber and Suakin. The preliminary surveys have been made, and the cost of construction is fixed at 1,770,000 pounds Egyptian. The expenditure of this sum, divided into four annual instalments, has been authorized. The work will begin at once, and it is expected that the railroad will be in operation within four years. The effect of the road will be greatly to diminish the cost of transporting commodities to and from the Anglo-Egyptian Sudan. The only outlet by steam at

present is along the Nile, where the great length of the route and several transhipments between land and water make it a very costly highway for freight. It is expected that the Berber-Suakin railroad will largely promote the development of the Sudan.

ASIA.

THE RAILROAD BETWEEN DAMASCUS AND MECCA.—A long account of the progress of this railroad appears in the *Mitteilungen* of the Vienna Geographical Society (Band XLVII, Nos. 1 and 2). The idea of building a railroad to convey pilgrims between Damascus and Mecca originated with Mehemet Izzet Pasha, the second secretary of the Sultan of Turkey, who heartily took up the project, and in July, 1900, proclaimed his intention to carry out the scheme. The length of the railroad, which will supplant one of the most thronged of the pilgrim routes, will be 1,054 miles. The section between Damascus and Amman, about 140 miles, was completed in September, 1903. The road will probably be completed to Mahan, 164 miles farther south, about the end of this year. If this expectation is fulfilled, nearly a third of the road will be completed by the end of the year.

The route extends southward from Damascus through the fruitful plateau that ends some 70 miles south of that city, thence parallel with the Jordan Valley and the Dead Sea, and 25 to 30 miles west of them to Mahan, where the line will strike off to the southeast to Medina across the red waste of northern Arabia, and thence south to Mecca.

Along the two-thirds of the route to be built after this year the difficulties may be considerable. Large sums have annually been paid to the Beduin tribes of the desert to keep them from molesting pilgrims. It remains to be seen whether their hostility and the aridity of the country will be serious obstacles. It is believed, however, that the railroad may be completed to Mecca about 1912.

The Mohammedan press has helped to arouse great interest in the project throughout Islam, which is important for its success, as the Sultan is chiefly relying on contributions to carry it out. Large sums have been given even by the Mohammedans of China, India, and the Dutch East Indies, who will never use the route, as their way to Mecca is by sea to Jeddah. Islam, generally, is supporting the enterprise in a substantial manner; and in addition to these contributions the Turkish Government has imposed a special tax for building the Hedjaz railroad, and all officials and employees receiving more than 500 piastres a year must pay a very small percentage of their salaries into the fund.

Some ideas which the Sultan at first wished to carry out have been abandoned. The track is being laid as a narrow instead of a broad gauge road. The notion that only workmen and supplies from Mohammedan countries should be used was naturally abandoned. Italian and Austrian labourers are largely employed, and the whole work, of course, is under the direction of Western engineers and other experts. The plans include the improvement of the port of Haifa. The railroad that connects it with Lake Genesaret will be extended to the Hedjaz railroad. Other feeders of the road will, in time, be built from El Akaba and Jedda on the Red Sea. The entire southern three-fourths of the line will run through an arid region, and only its Syrian portion is likely to be of considerable value for the transportation of commodities.

RELIEF MAP OF JAPAN.—Mr. Shimpei Kamase has presented to the Society's library an excellent photograph of his relief map of the Japanese Empire, which is attracting much attention in the Transportation Building at the St. Louis Exposition. This map, about 100 feet in length by 50 in width, is so large that a clear idea of relief features is given without very great exaggeration of the vertical scale. The exaggeration is threefold—sufficient, of course, to distort in some measure the mountain features, but it does not give the observer the grossly-erroneous impression of the topography that is conveyed by not a few relief models where the vertical is five to eight times as large as the horizontal scale. The map, made at Fukuoka, the home of its designer, is based upon the General Staff Map, and the results of the topographic surveys have been carefully reproduced in this miniature representation of the mountains, valleys, plains, and seas of the island empire. Every place of any importance is indicated; and the map gives a vivid idea of the remarkable development of Japan in postal, railroad, telegraph, and steamship enterprises.

TYphoon of October 25-26, 1903, IN THE PHILIPPINES.—The October, 1903, *Bulletin of the Philippine Weather Bureau* brings an account of the typhoon of October 25-26, which passed centrally over Tuguegarao (Lat. $17^{\circ} 35'$ N., Long. $121^{\circ} 39'$ E.), and almost completely destroyed that place. The observer, after two rooms of his house had been carried away by the wind, took the barometer to the parochial residence, "where the stone walls of the house offered a more secure place for it," and there continued to take readings throughout the continuance of the storm. The "eye" of the storm reached the station at 7.52 P.M., and lasted about six or

eight minutes. The wind changed from northwest in front of the vortex to southwest behind it. A partial summary of the observations during this interesting storm is as follows:

DATE.	BAROMETER.	DIRECTION.	WIND FORCE (0-12).	RAIN.	REMARKS.
Oct. 25.					
3.00 P.M.	29.236 ins.	N.	11	—	Sky overcast.
4.00 "	29.181 "	N.	12	—	" "
5.00 "	29.059 "	N. N. W.	12	8.82 ins.	Storm at its height.
6.35 "	28.724 "	N. W. by N.	12	—	" " "
7.00 "	28.547 "	N. W.	12	—	" " "
7.45 "	28.362 "	N. W.	12	—	" " "
7.52 "	—	—	—	—	Calm of the vortex; wind swinging round to the west; blowing furiously and becoming steady from S.W.
8.00 "	—	—	—	—	Barometer starts rising.
9.00 "	28.949 "	S. W.	12	—	Wind continues with some violence.
11.00 "	29.189 "	S. W.	11	—	Storm decreasing.
Oct. 26.					Rainbow stretching
6.00 A.M.	29.468 "	S.	4	—	from S. W. to N. W.

R. DEC. W.

THE BRITISH EXPEDITION INTO TIBET AND THE EFFECTS OF THE ALTITUDE.—The British expedition into Tibet has met with some of the difficulties which could easily have been foretold by any one at all acquainted with the natural effects of the cold and of the diminished pressure on the Tibetan plateau. The London *Times*' special correspondent (quoted in *Nature*, Vol. 69, 1904, 540) has recently called attention to some of these difficulties. A temperature of -26° Fahr. was recorded at one encampment (Chuggia, on the Tang-la). The normal night minimum during January and February is probably -10° for 15,000 feet of altitude in that region. Indigestion has been common among the men on account of their eating improperly-cooked food. At 15,000 feet it was found almost impossible to boil rice properly, and of the five different kinds of lentil supplied to the troops only one was capable of being cooked at all at heights above 10,000 feet. A second quotation from the London *Times* is to the following effect:

Any tire in physical science could have told the military authorities that at 15,000 feet above the sea oil ceases to be a lubricant and becomes a clog. Also that the temperature of water boiling in an open vessel falls roughly two degrees Fahrenheit for every 1,000 feet you ascend. He could also have given the remedy in both cases. Our men ought to have had pure glycerine to lubricate the locks of their rifles and Maxims. They ought to have had cooking-pots with air-tight lids furnished, with safety valves blowing off at a pressure of fifteen pounds on the square inch. Then

they would have had no trouble with their rifles or cooking. The tiro could also have pointed out that the elasticity of springs, and especially of certain kinds of springs, is greatly affected by temperature, and that it would have been well to test the Maxim's at such temperatures as they would certainly have to encounter.

R. DEC. W.

NOTES ON THE CLIMATE OF ARABIA AND ALONG THE PERSIAN GULF.—Mr. David G. Fairchild, of the Department of Agriculture, who was recently sent to Arabia and Persia in order to secure the best varieties of date plants for use in Arizona, contributes to the *National Geographic Magazine* (Vol. XV, 1904, 139-151) an illustrated article giving an account of his journey. Several interesting notes on climate are included. Along the shores of the Persian Gulf the winter season is the only part of the year when life is at all comfortable. At this time (December 1-April 15) the climate resembles that of the deserts of California or the winter climate of Egypt. At Muscat a temperature of 110° at 4 A. M. is stated to be frequently recorded, and

the few Europeans who are doomed to live there succeed in making life bearable by means of specially constructed fanning machines, which blow the air through wetted screens of grass roots.

In order to avoid the heat of the summer, it is the custom for the wealthy natives, as well as for Europeans, to spend as much of the day as possible in the innermost recesses of their houses, with every opening which might admit the hot air closed and darkened. It is the prevailing custom to sleep on the roofs or upper verandas. Regarding the agricultural possibilities of the country through which the projected railway from Aleppo to Bagdad and the Gulf is to pass, Mr. Fairchild believes that there is no climatic obstacle to human settlement, the winters being pleasant and the summers no warmer than in the desert regions of the southwestern United States. Irrigation will, of course, be necessary, but where irrigation is possible, the scheme of attracting settlers does not seem chimerical. Mr. Fairchild is of the opinion that plants which grow in the Nile Valley and in Arizona and southern California would grow satisfactorily in this part of Persia. Cotton could probably also be raised there, and some varieties of wheat. The possibilities of stock-raising will depend upon the amount of alfalfa or of other crops which can be successfully grown there. An interesting consequence of the absence of trees, and hence of lumber, along the shores of the Persian Gulf, is seen in the construction of the boats, which are made of the mid-ribs of the leaves of the date-palm.

R. DEC. W.

VARIATION OF RAINFALL AND POPULATION IN INDIA.—Mr. W. L. Dallas, of the Meteorological Department of India, contributed a paper on "The Variation of the Population of India Compared with the Variation of Rainfall in the Decennium 1891-1901," at the April meeting of the Royal Meteorological Society, in London. The author showed that during the four years 1891-5 the rainfall was generally normal or heavy over nearly the whole of India, and during the six years 1895-1901 the rainfall was greatly deficient. During the former, or "wet" period, the rainfall was deficient over Upper Burma and Madras, was normal over the remainder of Burma, Assam, Bengal, and the west coast of the Peninsula, and was excessive elsewhere; while during the latter, or "dry" period, the rainfall was again deficient over Upper Burma, normal or excessive over the remainder of Burma, Assam, Bengal, the United Provinces, the Northwest Frontier Province, and the south of Madras, and was deficient elsewhere—most so over Rajputana and the neighbouring areas.

The general census of India, taken on March 1st, 1901, showed the total population to be 293,475,477, which, excluding the territories not included in the census of 1891, was an increase of only 1.3 per cent. The population has thus failed to increase according to the normal rate during the decade. Part of this failure was no doubt due to epidemics, but the author shows that there is an unmistakable relationship between the variations of the population and the variations of rainfall during the six dry years. The area within which the most serious decrease of population occurred coincides almost exactly with the area of greatest deficiency of rainfall.

R. DEC. W.

POLAR REGIONS.

BAD ICE CONDITIONS IN BARENTS SEA.—A cablegram from W. S. Champ, who is trying to carry supplies on the steamer *Frithjof* to the Siegler-Fiala Arctic Expedition in Franz Josef Land, announced on Aug. 1st that he had been unable to find an opening in the ice of the Barents Sea. He said, however, that the ice conditions were then more favourable, and his party would sail again from Vardö and try to reach Franz Josef Land this season.

Since the archipelago was discovered in 1873 the round trip across these waters has often been made by steamers in a single season. The sea is sometimes almost entirely free from ice, but at other times it is covered with heavy floe-ice, through which it is impossible to force a way. It is unfortunate for Mr. Ziegler's

polar enterprise that the past three seasons have been very bad years in Barents Sea. It is unusual for the sea to be ice-choked for so long a time.

The Fiala Expedition of last year may have reached Franz Josef Land, though nothing has been heard of it. Its vessel, the *America*, set out for the Arctic on July 10th, last year, from Vardö, on the north coast of Norway. When west of Novaya Zemlia, the expedition reached the edge of the ice-pack and followed east for many miles, vainly looking for a lead through which to push north. On June 20th the *America* fell in with a sealer bound for Norway, and Fiala sent by this vessel the last information he had an opportunity to despatch. He said he was about to turn westward and follow the ice-edge towards Spitzbergen, in the hope of finding an opening to the north in that direction. His hope was evidently realized, but his further fortunes are problematical. He may have been lucky enough to reach Franz Josef Land last autumn, but if so it was too late for the *America*, according to the plan, to return to Norway that season. Considering the ice conditions, we need not be surprised to hear that the vessel was frozen in the pack, and spent last winter helpless in the ice between Franz Josef Land and Europe.

If the expedition was adrift all last winter, its plans for establishing supply stations in the Far North for the benefit of the sledge party which was to make a dash for the pole early this year must, of course, have been defeated. Such delay would require at least another year in the Arctic to give the northern sledge journey the best possible chance for success. If Mr. Champ has the good luck to reach Franz Josef Land this fall, he cannot possibly return this season, and so no news from the two parties is to be expected until next year.

THE SCOTTISH ANTARCTIC EXPEDITION.—On July 21 the *Scotia*, with the members of the Scottish National Antarctic Expedition, arrived home. In advance of the detailed report of the second year's work of the *Scotia*, it may be said that in February last the vessel returned to the South Orkneys from Buenos Aires, where she had gone to coal and refit. She then continued her explorations in the Weddell Sea, south of the Atlantic. The expedition reached $74^{\circ} 1'$ S. Lat., 22° W. Long., and was there stopped by the ice, remaining fast for a week. After getting free the vessel coasted for more than 100 miles along what the expedition believes to be the Antarctic Continent, which thus lies some 600 miles north

of the position in which it has been supposed to lie. Crossing Ross's Deep, which proves to be 2,600 fathoms where Ross marked "4,000 fathoms, no bottom," the *Scotia* sailed northward to Gough Island, where a party landed for the first time. It is believed that the collections made on this island will prove of great scientific importance. Thence the *Scotia* sailed to the Cape and home.

Sir John Murray, in presenting the gold medal of the Royal Scottish Geographical Society to Mr. Bruce, the leader of the expedition, emphasized in his speech three points of importance in regard to its work: First, that the *Scotia* had penetrated 300 miles further into the Antarctic than the vessel of any other recent expedition; second, that the expedition had discovered the Antarctic Continent in a position where it was not previously known to exist; and third, that it had accomplished a large amount of accurate oceanographical work.

A NEW POLAR PROJECT.—Mr. Charles Bénard described a new scheme for a North Polar Expedition at a meeting of about fifty scientific men, held in the house of the Prince of Monaco in Paris on June 19. Mr. Bénard gave his reasons for believing that the only feasible and rational route of penetration of the Polar Sea was one a little north and east of that followed by the *Fram*. He said the expedition should start from a Norwegian port, cross the southern part of Barents Sea, take in dogs at Karadora, sail along the coast of Yalmal, and arrive at the end of autumn at the New Siberia Islands. It should not then go north, as did the *Fram*, but should manage at all costs, even if it were necessary to winter at Bennett Island, to reach a point on the meridian of 150° E. Long. From that point the ship or ships need only drift in the ice to cross the North Pole.

Mr. Bénard urged the utility of sending an expedition composed of two vessels in touch with each other by means of wireless telegraphy. The expedition should be provisioned for five years, but would not probably be in the field more than three years. The gentlemen present signed a memorandum declaring the expedition to be of scientific utility. It would cost about \$240,000, and, according to the French press, there is some prospect that the expedition, under the stimulus of the Prince of Monaco, will be organized.

To complete North Polar exploration Mr. Bénard advocates not only such costly expeditions into the unknown Arctic seas, but also annual journeys to study smaller areas, after the manner in which the

Danes have carried on the exploration of Greenland for the past thirty years, with important results. They have thoroughly surveyed and studied the coasts and the ice-free coastal lands from 72° N. on the east coast to 77° N. on the west side of the island.

AUSTRALIA.

CARRYING LIVE FISH TO THE SOUTH PACIFIC.—The Report of the Fish Commission of New South Wales for 1902 describes a successful attempt to transplant sea-fish from the coasts of Scotland to the waters of the Southern Pacific. None of the leading food fishes of the north Atlantic, such as the cod, herring, turbot, and plaice, are found in the ocean off the coasts of Australia. Experiments with the transportation of fish ova failed, and it was therefore decided to try to introduce young or nearly mature fish, experimenting at first on a small scale.

The plaice, one of the principal flat fishes in the British market and a hardy animal of wide distribution, was selected for the first experiment. Seven hundred and twenty-two of them were placed in tanks in a fish chamber built on the deck of a steamer which started for Sydney, 12,342 miles away, on June 21. The temperature of the water in the tanks at the start was just right at 58° . After warmer latitudes were reached the water in the tanks, which was very frequently changed, was artificially cooled.

After a journey of about five weeks 640 of the fish arrived at Sydney in very good order, though their nature had become somewhat changed, as they had lived for two and a half months in absolute inactivity and were more or less domesticated. They were turned loose in a large enclosure of the waters at Fort Hacking, about eighteen miles down the coast, where they were shielded from strong tides and had favourable conditions for adapting themselves to the environment of Australian waters. It is believed to have been found practicable to transport European sea fishes to these waters, and if some of the best varieties prove to be adapted to the conditions of the Southern Pacific the value of the fishery resources will be much enhanced. At last accounts the fish seemed to be thriving.

NEW MAPS.

AMERICA.

ALASKA.—Topographic Map of the York Region, Alaska. Scale, 1:250,000, or 3.9 statute miles to an inch. *Bulletin* 229, U. S. Geol. Survey. Washington, 1904.

The map is based upon the survey carried out in 1901, in view of the discovery of placer tin in that region in the previous year. The locations of tin ore are distinguished according as the ore was discovered in placers or lodes, wagon trails leading to the deposits are shown, and the relief features are indicated by contour lines with 200-feet interval. The publication of the geological results of the survey is deferred until a more complete study of the notes and specimens is made. The region has the general form of an isosceles triangle with its apex at Cape Prince of Wales and its two sides formed by the shore-lines of the Arctic Ocean and Bering Sea. The map shows that the southern coast-line is in the main unbroken by inlets or harbours. The land usually presents abrupt escarpments rising from narrow, rocky beaches, giving it a forbidding character.

PORTO RICO.—Map of Porto Rico, showing Location of Mining Claims. Scale not given. *Bulletin* 6, Bureau of the Census. Washington, 1904.

The map shows approximately the location of the iron, lead, copper, gold, and silver mining claims and of the salt deposits and mineral springs. As no scientific survey of the island has been made it was impossible to show the exact geographical position of these claims, but the general purpose of indicating their approximate situation is well served. The approximate boundaries of the municipalities into which the island is divided are also shown. The information as to the distribution of minerals was obtained by Mr. W. F. Willoughby, Treasurer of the island, the sixty collectors of taxes, and the Chief and employees of the Bureau of Mines. With the exception of the work at quarries and brickyards there were practically no mining operations in Porto Rico during the year covered by Mr. Willoughby's report, and the present effort is to determine more exactly the character and extent of these resources, which are certain to be of great value to the island in the future.

CENTRAL AMERICA.—Nicaragua (Climatic and Agricultural). Scale, 1:792,000, or 12.5 statute miles to an inch. Prepared in the International Bureau of American Republics, W. W. Rockhill, Director. Washington, 1903.

This timely product is based largely on information contained in Dr. Karl Sapper's "Mittelamerikanische Reisen und Studien aus den Jahren 1888 bis 1900." Five tints are used to show the elevations above the sea and the zones of temperature corresponding to the differing altitudes. Symbols show the areas where the leading crops are cultivated. The scale is so large that there is no confusion or illegibility, and the result is a very good economic map of the Republic.

CENTRAL AMERICA.—Nicaragua. Scale, 1:792,000, or 12.5 statute miles to an inch. Prepared in the International Bureau of American Republics, W. W. Rockhill, Director. Washington, 1903.

A political and transportation map of the Republic, showing also the mining districts. The boundary line between Nicaragua and Costa Rica is given according to the recent agreement between the countries.

PANAMA.—General Plan of the Panama Canal. Scale, 1:100,000, or 1.5 statute miles to an inch. War Department, Washington, D.C., 1903.

The map accompanies (in pocket) "Notes on Panama," compiled by Capt. H. C. Hale. It is based upon the surveys and plans of the reorganized French Panama Canal Co., and is valuable now chiefly as showing the results of the French surveys indicated by contours, and because its large scale makes it possible to give a clear idea of the topography, hydrography, and settlements along the canal zone.

AFRICA.

GERMAN EAST AFRICA.—Karte der Gebiete am südlichen Tanganjika und Rukwa See. Scale, 1:500,000, or 7.8 statute miles to an inch. Based upon the surveys of Captain von Prittwitz u. Gaffron, together with the unpublished surveys of nine other Government officials and all published materials. Published in the *Mitteilungen of Explorations and Scientific Studies in the German Protectorates*, Vol. XVII, No. 2, Berlin, 1904.

This is one of the admirable maps that the German Government is producing of German East Africa. The vast area is now being mapped in a manner superior to that of any other part of tropical Africa. While the detailed surveys cover only parts of the region, the astronomical positions of a sufficient number of points have been fixed to be of great assistance in approximately accurate mapping. The trigonometrical points established are those of the German-British Boundary Commission and of the German Expedition for Pendulum Observations. In the area covered 780 absolute heights above sea-level were measured and 100 relative heights were estimated. The map embraces the region between 30° and 34° E. Long. and 6° 50' and 8° 50' S. Lat. It is rich in native place-names, including those of abandoned villages, makes the Government and missionary stations conspicuous, shows telegraph lines, and represents elevations by brown shadings. The outlining of the east coast of the southern half of Tanganyika is the most detailed that has yet appeared. The present extent of the dwindling Lake Rukwa is in striking contrast with its indicated former coast-line, showing that its area has decreased about three-fourths. Such sheets as this are rich in material for the improvement of our atlas maps of Africa.

RHODESIA.—Geological Map of Southern Rhodesia (Bulawayo Sheet). Scale, 4 miles to an inch. By F. P. Mennell. Rhodesia Museum, Bulawayo, 1904.

This map is the first sheet of a geological map of Southern Rhodesia on a scale of four miles to an inch. The sheet embraces an area of 2,000 square miles, and 100 sheets on this scale will be required to cover the whole region. Owing to the prominence of the mining industry the knowledge of the geology is much in advance of topographic surveys, and this makes it difficult to place the geological data accurately on a map. Great pains have been taken by Mr. Mennell, however, to give a fairly adequate idea both of the geology and topography of this small area.

AFRICA.—Missionskarte von Afrika. Scale, 1:14,500,000, or 230 statute miles to an inch. By P. H. Hansen, S.V.D. Carl Flemming, Glogau, 1903.

The map is especially rich in information concerning the Catholic Missionary Societies and the territory assigned to each of them. The colours show the regions in which each Society is working. It may be seen at a glance, for example, that the Jesuits have their stations scattered over a vast area in the middle and upper parts of the Zambezi basin, also in the district between Stanley Pool and the Kassai, tributary of the Congo, and in a wide zone across Madagascar. The Sahara is the undisputed domain of the White Fathers, but in many regions the Protestant stations equal or outnumber those of the Catholics. Data relating to the Catholics are given in red, those relating to the Protestants in black, so that there is little danger of confusing them, though in places the map is somewhat overcrowded.

ASIA.—Physikalische Karte von Asien. Scale, 1:7,000,000, or 110 statute miles to an inch. By Gustav Richter. Published by G. D. Badeker, Essen.

A typical German physical map for school purposes. It is designed to hang on a wall of the classroom, and to show all the chief physical features of the continent so clearly that the children on the back seats cannot fail to see them. A boy fifty feet away could distinguish between the explored and the unexplored parts of the rivers, observe the trend and the conspicuous features of the mountain and river systems, the woodlands, the grassy and barren steppes, the deserts, moors, and tundra, and seize upon many of the other broader aspects of land and sea. The advantage of such maps is that they impress upon the pupil the more vital facts and help the teacher in his exposition of them.

CHINA.—Walter Anz' Reisen in Schantung (1902-1903). Scale, 1:1,000,000, or 15.7 statute miles to an inch. *Petermanns Mitteilungen*, Vol. 50, No. 6, 1904. Justus Perthes, Gotha.

The map shows the routes of Mr. Anz during the winter journey in 1902-03 through the province of Shantung and the northern part of Kiangsu. It illustrates a very interesting paper and outlines the broader aspects of the topography. Insets show profile sketches of some of the more important mountain ranges.

PHILIPPINE ISLANDS.—Two maps showing "Mean Annual Temperature" and "Mean Annual Rainfall." No scale. Illustrating "The Climate of the Philippines," *Bulletin* 2, Bureau of the Census, Washington, 1904.

The temperature map is in four colours, showing regions of high, intermediate, mild, and cool temperature. The cool areas are, of course, confined to the higher altitudes. The rainfall map has six tints, to show degrees of precipitation from under 40 to over 120 inches a year.

PHILIPPINE ISLANDS.—Two maps showing "Relative Frequency of the Earthquakes" and the "Active and Dormant Volcanoes." No scale. Illustrating "Volcanoes and Seismic Centers of the Philippine Archipelago," *Bulletin* 3, Bureau of the Census, Washington, 1904.

These maps were first printed late in 1902 in Manila in a *Report* prepared by the Rev. M. Saderra Masó, S. J., Assistant Director of the Philippine Weather Bureau. The information, covering the complete record of seismic phenomena for eighteen years, was presented in a map published in the *BULLETIN* of the American Geographical Society (Vol. XXXV, p. 67, 1903).

CEYLON.—Map of Ceylon. Scale, 1:1,101,760, or 16 statute miles to an inch. Survey Department of Ceylon, Colombo, 1904.

The map shows the railroads, other roads and cart tracks, and the progress of the topographical surveys. It is half the scale of the eight inch map which was completed last year, and which is the first approximately accurate map made of the island, the most of it being based upon detailed surveys.

EUROPE.

ENGLAND AND WALES.—A Series of 84 Plates of Maps and Plans, with Descriptive Text illustrating the Topography, Physiography, Geology, Climate, and the Political and Commercial Features of the Country. Designed by and prepared under the direction of J. G. Bartholomew. John Bartholomew & Co., The Geographical Institute, Edinburgh.

The publication of this important work was begun in February, 1903. The atlas is similar in character to that which Mr. Bartholomew produced of Scotland eight

years ago. The maps are based upon the one inch to the mile sheets of the Ordnance Survey, which are filled with information of the highest accuracy, but are so numerous that most private persons cannot acquire them, and they are very unwieldy for the study of large areas. Mr. Bartholomew is very carefully reducing these sheets to a scale of two miles to an inch, and they are being published in 21 parts, sold at 2s. 6d. a part, each containing four map plates. The work will soon be completed, and the maps and plans will be followed by the descriptive and statistical text. The first eleven maps show the topographical and geological features of England and Wales, their climatology, distribution of vegetation and agriculture, political and ecclesiastical divisions, and commercial and industrial aspects. These are followed by the detailed sheets reduced from the Ordnance Survey maps, showing towns and villages, railways, main and other driving roads, footpaths and bridle paths, canals, and an admirable presentation of the relief of the land shown by a combination of contours and tints. As many as ten tints are used on some of the sheets to show elevations of the surface; and the delicacy of the tints, their accurate registration, and the clearness with which all information is presented place these maps very high among cartographic products. The last six sheets of the atlas will contain plans of the leading cities.

MEDITERRANEAN LANDS.—Die Verbreitung des Ölbaumes im Mittelmeergebiet. By Prof. Dr. Theobald Fischer. Scale, 1:10,000,000, or 157.8 statute miles to an inch. *Petermanns Mitteilungen, Ergänzungsheft No. 147*, 1904. Justus Perthes, Gotha.

Tints of green show areas of the cultivation of the olive tree, the deeper the shade the more extensive being the industry. The map illustrates an exhaustive monograph by Dr. Fischer on the distribution, history, and economic importance of the olive tree.

SWITZERLAND.—Verteilung der mittleren Höhe in der Schweiz. No scale. *Jahresbericht of the Bern Geographical Society, Vol. XVIII*, 1900-1902.

A sketch map on which the mountains are divided into a large number of groups, the mean height of each group being indicated by figures.

SWITZERLAND.—Verteilung der Bevölkerung im bündnerischen Oberrheingebiet nach ihrer Dichte. Scale, 1:400,000, or 6.3 statute miles to an inch. *Jahresbericht of the Bern Geog. Soc., Vol. XVIII*, 1900-1902.

Showing by colors ten gradations of the density of population along the Rhine and its tributaries in the extreme upper part of the Rhine basin.

PRUSSIA.—Siedlungskarte der Insel Rügen. Scale, 1:150,000, or 2.38 statute miles to an inch. Eighth *Jahresbericht of the Geographical Society of Greifswald*, 1900-1903.

This is an excellent cultural map of the largest island of Germany in the Baltic. The areas of woodland, meadow, and moor are distinguished, and the steep parts of the coast and the dykes which protect other portions of shore-line are shown. Small dots show the isolated houses outside the settlements, and six symbols are used to show the population of the villages.

BOOK NOTICES.

Expansion of Russia. By Alfred Rambaud. With an Essay on the Russian People by J. Novicow. Second Edition. 254 pp. Scott-Thaw Company, New York, 1904. (Price, \$1.)

Mr. Rambaud's paper, which gives the book its name, is scarcely longer than the psychological study of the Russian people by Mr. Novicow, with which the volume concludes. Mr. Rambaud follows Russia in all the directions in which her policy of expansion has carried her, and studies the means she has employed, especially in what concerns her expansion in the East. He traces the origin and steady growth of the nation in Europe, her advance in the Caucasus and towards India, the opening of Siberia, and the Chinese concessions. He has not written a history, but has dealt with the philosophy of the great movements that have made history, the underlying impulse, and the outcome, all clearly and simply expressed and illustrated by many pregnant historical allusions. The author distinguishes between Russia's progress in Europe, which usually was the cause or the result of bloody wars, and her advance in Asia, where, for the most part, she has exhibited a prudence wholly oriental. Though he calls the government of Russia an enlightened despotism, his writing is judicial and not partisan in tone. Mr. Novicow's paper is a very suggestive and interesting analysis of the people in their race and temperament, general psychology, politics, and present condition. The book is valuable and timely.

The Wonderful Story of Uganda. By the Rev. J. D. Mullins. 224 pp., 13 half-tone illustrations, 2 maps, Bibliography and Chronology of Uganda, and list of Protestant Missionaries. Church Missionary Society, London, 1904. (Price, 3s. 6d.)

The work of the Uganda missions is rightly regarded as one of the wonders of modern days. This book is not an exhaustive history of the mission work, but it presents the more vivid and picturesque scenes of the remarkable story so far as it relates to the Protestant missions. It does not deal with the Catholic missions, which have been equally successful. The most striking incidents in the development of the Protestant missions are well told. It could scarcely help being a remarkable narrative, for it relates to a nation which, 25 years ago, had not heard of Christianity, and was without a written language. There are to-day over 30,000

professors of the Protestant Episcopal faith, the Luganda language has been reduced to writing, the whole Bible has been translated, the people support their own ministry, and have even established missions among the tribes around them. The work now covers so much ground that the white missionaries devote themselves almost entirely to instructing the native teachers and superintending the work done by them. The medical feature of the work is very important. Some of the most interesting among the pictures relate to scenes in school and at the book shops, where natives are exchanging cowries for books. One of the maps shows the chain of mission stations that has been established across Equatorial Africa.

The Stone Reefs of Brazil, their Geological and Geographical Relations, with a chapter on the Coral Reefs. By John Casper Branner. *Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. XLIV; Geological Series, Vol. VII.*

These reefs are not coral, though they have often been so reported, but to casual observation they resemble coral reefs, and are found along much of the Brazilian coast. They have had an important influence on human occupation, and, therefore, are distinctly geographic in their significance; for Pernambuco, Rio Grande do Norte, Santa Cruz and other ports owe existence to their protection. Among the characteristics summarized are these: The reefs consist of indurated sand; they are low and flat-topped, being exposed at low tide; they are nearly straight, and are formed by the consolidation of beach-sands in place. Corals sometimes grow on the reefs, and in other cases the reefs are superimposed on dead corals.

The author's work was begun in 1875-77, continued in 1881-83, and concluded in 1899, the last visit being made through Dr. Alexander Agassiz. The work has been done under great limitations, because there is no good topographic map of the Brazilian coast.

The introduction is followed by an account of the geology of this shore. For nearly two thousand kilometres there is a foundation of ancient crystalline rocks, cut by eruptive dikes and covered by sediments of Cretaceous and Tertiary Age. At one point is an intermediate series, which may be of Paleozoic Age. A considerable section describes the reefs in detail. The rocks of the various stone reefs contain fossil shells of mollusks that now live along the Brazilian shore-line; and yet the rocks are hard and sometimes take on a quartzitic character. In some cases the surfaces are smooth, and in others fitted and etched until exceedingly

ragged and even difficult to traverse. Borings of an English engineer, in 1874, showed that the Pernambuco reef has but three or four metres in thickness of the hard rock, which rests on sands, clays, marl, and shells. The various reefs are abundantly illustrated in the text with sections, maps, and views.

There is an extended discussion of the elevations and depressions of the shore-line. Evidence, however, does not point to such changes since the discovery of the country. Recent changes can be explained by reference to ordinary operations, without movements of oscillation. Both upward and downward movements are recorded for prehistoric times. Only the induration of the sands composing the reefs has permitted their preservation. This hardening is due to the infiltration among the sand grains of carbonate of lime. One sample of the rock shows 35.94 per cent. of matter which was soluble in concentrated hydrochloric acid. About six-sevenths of this soluble portion was lime carbonate. Some of this large amount was not due to infiltration, but to the presence of fragments of shells and corals as a part of the sand originally deposited. The origin of the cementing material is discussed at length, but may be considered as of greater interest to the geologist than to the geographer.

The reefs are believed to have been in process of formation since the depression of the coast in early Pliocene times. They are close to the adjacent lands—parallel to them, and of low altitude. The conditions of shore-lines are so subject to change that such reefs could hardly have survived for long periods. Some twenty-five pages are devoted to an annotated bibliography of the subject. Little value is ascribed to the papers named, except those of Darwin, Hartt, Rathbun, Hawkshaw, Fournié, and Béringer. The old maps of the coast have not been assembled, because they are conventional, and fail to show the forms and extent of the reefs.

As indicated in the title, the author has included an account of the coral reefs of this shore. Both the fringing* and the barrier reefs are represented by examples, and it is regarded as probable that some stone reefs have been covered and concealed by the corals. The volume is concluded by nearly one hundred plates, most of them reproduced from photographs. The non-technical reader, at least, will find these a most important aid in gaining true notions of these features of the Brazilian coast. It would be much to every reader's convenience if the titles of chapters had been used as running headings throughout the volume. A. P. B.

Recherches sur les Instruments, les Méthodes, et le Dessin Topographiques, par le Colonel A. Laussedat, Membre de l'Institut, Directeur du Conservatoire national des Arts et Métiers. 2 volumes, 891 pp., 44 pl. Paris, Gauthier-Villars, Imprimeur-Libraire.

The first volume of this memorable work sums up the extent of the world's knowledge concerning the instruments and methods of topography, by portraying the whole course of the evolution of modern appliances from the simple apparatus and equally simple practices in times of remote antiquity of the surveyors of Arabia and Egypt, in whose methods are found the germs which have developed in the intervening ages into the methods of the present day.

The author has characterized his work with erudition and research, and has presented it with grace and precision, touching upon the allied subject of the evolution of the instruments and methods of astronomy as far as their influence upon topography and geodesy has been important, and bringing out with striking distinction the immense influence of the application of such inventions as the telescope and the vernier in the construction of topographical instruments. Progress for 2,000 years has been marked, not by any great discovery in the geometrical conceptions which prescribe the kinds of measurements that are required in topographical work, but by the improvement of the means that have been applied to effect these necessary measurements in the field. The numerous figures which accompany the historical and explanatory text add greatly to the effect of that part of the plan of the work, which aims to convey a knowledge of the construction of the existing instruments for topographical measurements, and of their dependence upon and connection with those which have been formerly employed but have now passed into disuse.

Following this excellent account concerning instruments and surveying is an equally commendable exposition of the stages through which the art of topographical drawing has passed since the time when drawings were mere pictorial imitations, such as are found in hieroglyphics and seen in the vestiges of sculpture chiselled in rocks that have resisted the action of the elements. This kind of drawing became more and more expressive in the course of centuries, as may be seen in the paintings, the mosaics, and the bronze medals of ancient times, and in the manuscripts, the sculptured ivory, the bas-reliefs in bronze and marble, and the tapestries of the Middle Ages; but it was not until the sixteenth century that artists taxed themselves by observing the rules of perspective. In Greece

and Rome the land surveyors began in the early centuries of the Christian era to use the plan as a means of representation, and there grew up in succeeding centuries a combination of the plan and the perspective by which important features embraced within a general plan would be represented by pictorial drawings. In fact, the art of topographical representation, as it is now recognized, remained in eclipse until quite recent times. At the period of the Renaissance pictorial topography still prevailed, and in nearly the same condition in which it was practised in ancient times. In the time of Mercator, geographers still sought to give an agreeable aspect to their maps, as far as the scale would permit, by representing the relief of the terrain by a series of forms drawn in perspective and rebatted from south to north on the face of the chart. It was not until after the middle of the eighteenth century that maps began to be constructed exclusively on geometrical principles. The relief of the terrain was generally represented in these maps by hachures, producing varying tones to represent the changing slopes of the surface forms and opening up a vast field of artistic development to the scientific topographer. Contour lines of equal level were first employed in hydrographic charts by the Dutch and French engineers, and, as levelling instruments became more perfect, the advantages of this mode of representing the relief features in maps came to be generally recognized—among engineers on account of its benefit in projecting engineering works, and among geographers because it has rid their productions of the illusions and false ideas that formerly prevailed in maps, concerning the forms and heights of the topographical features.

Having shown in the history of the development of the instruments and methods of topography that the ruling object has been the abridgment of operations in the field and the attainment of exactness and celerity in the direct measurement of distances and differences of level, the author proceeds, in a second volume divided into two parts, to unfold with masterful advocacy the applications of photography to the dominant aims of topographical and kindred measurements.

Colonel Laussedat has continued for many years to sustain his convictions of the utility of phototopographical methods, and his present work can be characterized as what might be expected from a man of keen scholarly mind, who, being thwarted in effecting the official adoption in his own country of methods which he believed to be capable of working important advances, has not ceased throughout his whole career eagerly to take in every important

idea and application touching the development of the theory that he had espoused, with the purpose of presenting at last a complete and convincing array of the evidences of the spreading adoption of the methods of metrophotography and phototopography and of the superiority of the results that have been achieved. The first part of this second volume, which in itself is a book of 184 pages, accompanied by 15 plates, is devoted to the theory of perspective and iconometry and of the camera lucida and the camera obscura, to the description and use of the instruments and apparatus employed in metrophotography and photography, and to the methods of utilizing photographic views in the preparation of maps and drawings. The treatment of the subject is made quite complete by including in the discussion not only these methods and instruments that are at present adopted for practical use, but also those that have been proposed and those that have been tried and set aside, and by exhibiting among the results the attainments in tele-metrography by the military observatories during the siege of Paris by the Germans.

The second part, containing 271 pages and 18 plates, is devoted to an exposition of the development and progress of metrophotography in France, Germany, Italy, Austria, Canada, Switzerland, Spain, Russia, and Great Britain, by holding up to view the most characteristic original works in the languages of these various countries, and by pointing out the application of the principles which they recite, not only to topography but also to the sciences and the arts which have borrowed the assistance of photography and often derived unexpected advantages from it.

G. W. L.

The Projection for the Map of the British Isles on a scale of 1/1,000,000, by Major C. F. Close, C.M.G., R.E. Published under the direction of Colonel D. A. Johnston, R.E., Director General of the Ordnance Survey. London: Printed for H. M. Stationery Office by Darling & Son, 1903.

Major Close's paper is the outgrowth of the advocacy on the part of the Sixth International Geographical Congress, assembled at London in 1895, of a map of the world on a scale of 1/1,000,000. In carrying out the portion of this project relating to Great Britain and Ireland, the British Ordnance Office found that the projections upon which the present Ordnance maps were constructed are such that the map to be produced could not be made by simple reduction from the existing ones, and, therefore, that such a projection might be adopted in the new construction as would be best suited

to the preparation of the map recommended by the resolution of the Congress. It was decided that the most convenient arrangement of the map would be effected by plotting the United Kingdom on one projection, in two sheets, so arranged that it would be possible to issue, in addition to a single sheet embracing the whole extent of the British Isles, separate maps of England and Wales and of Scotland and Ireland.

The decision to make one engraving serve at the same time for a general map and also for separate maps of the different parts of the country made it necessary to choose some form of projection in which the parallels of latitude are everywhere similar along any parallel; and the conical projection, in which the parallels are represented by concentric circles and the meridians by their radii, was accordingly adopted.

The three forms of conical projection, which were available for adoption, and which are discussed in the paper, are the conical projection with rectified meridians and the standard parallels, Lambert's orthomorphic conical projection, and Albers' equivalent conical projection. The last-named projection was eliminated from the discussion on the ground that, for the purpose of a map intended for general use rather than for statistical purposes, there was no reason for preserving the equivalence of areas at the expense of accuracy in measurements of length and direction.

As regards the other two, the first may be defined as a projection in which the meridians are the radii of the parallels, the angles between the meridians bear a constant ratio to the real differences of longitude, the parallels—two of which are of their true lengths—are concentric circles at their true rectified distances apart; and the second as a projection in which the meridians are the radii of the parallels, the angles between the meridians bear a constant ratio to the real differences of longitude, and the parallels—two of which are of their true lengths—are concentric circles at distances apart based on a convention and not strictly in accord with their true distances on the terrestrial sphere.

Major Close found that each of these projections could be constructed to embrace the United Kingdom and to extend from latitude 50° to 61° north of the Equator, with a maximum error of scale of about $1/400$, and that the first would have the advantage of no error in scale in the north and south direction and the second the advantage of no local error in azimuth. The errors in scale in the east and west direction are practically the same in each case; and the areas are misrepresented in each, but the areal error in

the first or rectified conical projection is about half that of the second or orthomorphic projection. In view of this superiority in the more correct representation of areas, and of the fact that the British Isles are far longer in a north and south than in an east and west direction, the rectified conical projection with two standard parallels was chosen and submitted to a detailed discussion, under formulæ which are clearly presented in the paper with an elegant simplicity, resulting in setting forth that the British contribution to the map of the world on a scale of 1/1,000,000 will be subject in linear and areal measurements to an error no greater than one part in four hundred and thirty-three, and in directional measurements to an error no greater than eight minutes of arc.

The author has chosen for the name of the adopted projection The Minimum Error Rectified Conical Projection with two Standard Parallels.

W. G. L.

Guido Rey. Il Monte Cervino. Illustrazioni di Edoardo Rubino, Prefazione di Edmondo de Amicis, Nota Geologica di Vittorio Novarese, 14 Tavole Colorate, 23 Disegni a Penna e Undici Fotografie. Ulrico Hoepli Editore-Libraio della Real Casa, Milano, 1904. 8vo. (Price, 25 lire.)

Mr. de Amicis thinks that to many persons a mountain will seem to be too small a subject for a big volume; but he advises them to read before they condemn. Every mountain is an interesting subject, and the Matterhorn has peculiar claims upon the reader.

The modern story of the great mountain begins with H. B. de Saussure, who devoted so many years to the study of the Alps. After the publication of his book (*Voyages dans les Alpes*, 4 vols., 1780-1796) tourists began to find their way into Switzerland, and in 1838 Murray brought out the first *Handbook* of that country. In those days travellers had to put up with strange fare and poor accommodations. There was a change for the better about 1860, when Mr. Rey finds in the Visitors' Book at Valtournanche the names of Bonney, Tyndall, Craufurd Grove, Leslie Stephen, Freshfield, and Mummery. An entry under the 27th of August, 1861, reads:

Edward Whymper en route for the Matterhorn.

Mr. Whymper had yet to encounter many defeats before his triumph on the 14th of July, 1865, when he and his guide Croz stood at last on the top of the "inaccessible" mountain.

Mr. Rey writes of Whymper with sympathy and admiration, and

regrets, with Whymper himself, that the conquest of the Matterhorn was achieved without Jean-Antoine Carrel.* Carrel missed it by three days. On the 17th of July, 1865, he and J. B. Bich, two out of four who ascended from the southern side, reached the summit of the mountain and planted their flag by the side of the cairn erected on the 14th by Whymper and Croz.

Two years passed before another attempt was made, and then, little by little, the climbing of the Matterhorn came to be regarded as part of the regular Swiss round. In 1871 Miss Walker made the ascent, and Vittorio Sella, after two failures, succeeded in 1882 in reaching the summit on the 17th of March, the first ascent made in the winter season. In 1892 twenty-three travellers and their numerous guides met on the same day on the top of the Matterhorn.

From time to time a fatal accident occurs, to warn the tourist of ever-present perils; but the telegraph and the railroad, none the less, threaten to invade the once unconquerable Matterhorn.

Mr. Rey is an alpinist, and has taken his share of mountain dangers. His sixth chapter, entitled *Il Cervino di Furggen*, is the description of a performance that oppresses the reader like a nightmare, and makes him adopt for his own the comment quoted from the *Journal de Genève* (Sept. 15, 1899):

The Italian clubbist who had himself hoisted up the overhanging crest of Furggen deserves to be fined. He is a dangerous madman.

Mr. Rey confesses that he had not seen the matter in that light. There are but two kinds of persons in the world; those who are alpinists and those who are not.

The illustrations of the book, 48 in number, are not all effective, though they are well reproduced. The most striking are those from photographs, such as *The Summit of the Matterhorn from Giomein* and *The Matterhorn at Sunset*.

A summary of the geology of the mountain closes this magnificent publication.

Anschauliche Grundlagen der Mathematischen Erdkunde zum Selbstverstehen und zur Unterstützung des Unterrichts von Dr. Kurt Geissler. Mit 52 Figuren im Text. Leipzig Druck und Verlag von B. G. Teubner. (Marks 3.) 1904.

This is an elementary text-book, judiciously arranged for the

* He was the man, of all those who attempted the ascent of the Matterhorn, who most deserved to be the first upon its summit. He was the first to doubt its inaccessibility, and he was the only man who persisted in believing that its ascent would be accomplished. (Whymper, *The Ascent of the Matterhorn*, p. 280.)

purpose of imparting to the student a clear understanding of the salient principles of geodesy and of the points of contact between this science and the sciences of geology, meteorology, and physical geography. The discussions of the form and size of the earth, and of its mass and motions, are well presented, and geodetic astronomy is treated to an extent sufficient to round out the whole subject with completeness. The interest and value attached to the treatise are enhanced by a final chapter setting forth the most recent views, based on the most exact levelling operations and measurements of attraction, concerning the deformations of the terrestrial geoid from an exact figure of revolution. Careful investigations show that there is a decided tendency for the deflections of the plumb line to be in such a direction as to indicate that they are due to a defect in the mass of the oceans or an excess of mass in the continents, or to both, and that regional deflections common to considerable areas are due to the general or large features of the topography; and it has become evident that to make true progress in the study of the figure of the earth the relation between the deflections of the vertical and the general features of the surface forms must receive close attention.

G. W. L.

A Critical Study of the Various Dates Assigned to the Birth of Christopher Columbus. The Real Date 1451. With a Bibliography of the Question. By Henry Vignaud, First Secretary of the Embassy of the United States in Paris, Author of "Toscanelli and Columbus," etc., etc., etc. London, Henry Stevens, Son & Stiles, 39 Great Russell Street, over against the South-West Corner of the British Museum, 1903.

Mr. Vignaud has studied the information obtainable from the assertions of Columbus, from the testimony of his contemporaries, and from the documents of Italian notaries, in which mention is made of Columbus or members of his family; and he arrives at the conclusion that the Discoverer was born in 1451. The document which justifies this conclusion is one drafted at Genoa the 31st of October, 1470, by the notary, L. Raggio, wherein Columbus (then present with his father) is described as the son of Domenico, and nineteen years old.

Mr. Vignaud's argument that this date of 1451 fits in with the well-known facts in the life of Columbus is entirely sound.

He gives the credit for the first recognition of the date to Mr. Richard Davey, author of an article on *The Boyhood and Youth of Columbus* (*The National Review*, October, 1892).

In his Introduction Mr. Vignaud says that the necessary texts

will be found in his book. The first text given (on p. 2) is from the *Journal of Columbus*, Dec. 21, 1492, in these words:

Yo he andado veinte y tres años en la mar, sin salir della tiempo que se haya de contar.—(I have followed the sea for twenty-three years, without leaving it for any length of time.)

Mr. Vignaud makes Columbus declare *That he has overrun the world during 23 years almost without interruption*; a translation which does not even suggest the original. The words might be put in the mouth of Jenghiz Khan.

It is unfortunate that errors in the Bibliography have escaped the proof-reader. On p. 110 *Navarette* occurs twice, and a few lines below *scopitore*, *Rosseuw* St. Hilaire on p. 113, *Cantu* on p. 115, *Guinguén* on p. 116, and *Munoz* on p. 117.

THE DESERTS OF THE UNITED STATES.—The *Desert Botanical Laboratory of the Carnegie Institution* (Carnegie Institution of Washington, Publication No. 6, November, 1903. By F. V. Coville and D. T. MacDougal) promises to give us some valuable contributions to our knowledge of the desert meteorology of North America, as well as to those fields of investigation which lie along the borderline between meteorology and botany. The Laboratory was established at the suggestion of Mr. F. V. Coville, botanist of the United States Department of Agriculture, “the purpose of such establishment being to thoroughly study the relation of plants to an arid climate and to substrata of unusual composition.” The site selected is near Tucson, Arizona; a suitable structure has been erected, and investigations commenced in the autumn of 1903. Mr. Coville and Dr. MacDougal acted as a committee of inquiry in determining the best location for the Laboratory, and the present publication gives a brief narrative of their trip and of the desert flora met with in different districts. Numerous excellent illustrations of landscapes showing characteristic vegetation are included. Among the localities visited were the arid region of western Texas, the sand dunes of Chihuahua, the Tularosa Desert, Nogales, Torres, Guaymas, the Colorado Desert, the Mohave Desert, and the Grand Cañon of the Colorado, the vicinity of Tucson being finally selected as the best site for the Laboratory.

Among the various reasons determining the selection of Tucson was the fact that this place has a climate of a thoroughly desert character, and is centrally and conveniently located. In addition to the natural desert flora, which is rich and varied, there is a great variety of annual vegetation which springs up after a rain, espe-

cially after the repeated rains of the winter. Rain in these deserts is so important in its effects upon the rapid growth of vegetation that, as has been noted by McGee, the Papago Indians

chased rain storms seen from commanding peaks for scores, if not hundreds of miles; and wherever they found standing or running water or even damp soil, they planted their seeds,

and so scarce is water that these same Indians often cut off the top of a bisnaga, or barrel cactus, pound the white flesh in the standing trunk to a pulp, and then squeeze the water out of this pulp. Plate XVIII shows a Papago Indian drinking water obtained from a cactus in this way, two or three quarts of clear water having been secured from one plant. This water was

slightly salty and slightly bitter to the taste, but of far better quality than some of the water a desert traveler is occasionally compelled to use.

Exception is taken by the authors to the usual definition of a desert as

"a region of considerable extent, almost, if not quite destitute of vegetation," and the word is applied to areas

which support a sparse vegetation of a more or less specialized character owing to inadequate rainfall, or to the unsuitable composition or lack of soil.

A scanty water supply is the factor of greatest importance, and most deserts owe their existence to this control, but the authors are rightly careful to say that no arbitrary amount of rainfall can be named as being an invariable cause or accompaniment of desert conditions. The reason for this is to be found in the fact that the seasonal distribution of the rainfall is of very great importance in any region; for if the rain comes in a brief season, the rest of the year may be dry, and desert conditions may prevail. In certain parts of the tropics, for example, aridity prevails where there are 70 inches of rainfall.

The North American deserts are confined to the region of the Cordillera, occupying plateaux and plains both east and west of the main ranges, and extending over more than a million square miles. On page 28, Fig. 1, a map is given showing the location of, and the annual precipitation at, certain stations in the arid region of western America, and if these stations are connected by enclosing lines, the outlines of the great desert areas of the continent can easily be seen. These areas are two in number, and may be designated as the Sonora-Nevada desert (embracing portions of Utah, Idaho, Washington, Oregon, Nevada, California, Arizona, Lower California, Sonora, and Sinaloa), and the Chihuahua desert, which,

occupying the central Mexican table-land east of the Sierra Madre, extends as far south as San Luis Potosi, and includes parts of Texas, Arizona, and New Mexico, while the Bad Lands of the Dakotas and Montana and the Red Desert of Wyoming are to be regarded, for the purposes of the present Report, as a northern arm of the same region. Several tables of temperature and rainfall at a number of stations in these desert areas are given (pp. 25-27), but there is obviously a great uncertainty regarding the amount of annual evaporation (p. 27), concerning which we at present have practically no reliable information. Rough estimates of the evaporation show that at Tucson and at Laramie it is about seven times as great as the normal precipitation; while at Yuma, Arizona, it is more than thirty-five times as great.

Among the many facts of interest in this Report mention may be made of the temperatures recorded around the root tips of bunch grass at a depth of two inches. At 2.20 P.M., on July 16, 106° was recorded, and a few minutes later 108°, the air temperature being 91° to 93°. At 3 P.M. black volcanic sand around the roots of *Cleome serrulata* Pursh showed a temperature of 111°. The temperature of the soil at a depth of 1 inch near Tucson has a mean for July of 104.9° (Toumey), and around the roots of small herbaceous plants in the Grand Cañon, Arizona, the sandy soil showed temperatures of 148° on September 4, 1898 (Douglass). Thermometers whose bulbs were inserted into the stems of fleshy plants such as *Cereus* often showed temperatures of 113° to 115°, with air temperatures of 93° to 100°. The critical point of chlorophyl is usually given as 113°. Hence it is suggested that

the protoplasm of plants which have become adapted to this region must have undergone certain variations in composition, as its maximum point of activity is beyond that of other plants, and these forms must also be furnished with specially adapted chloroplasts, by which the chlorophyl would be kept from injury at temperatures beyond the critical point at which it suffers damage in other plants.

Some comparative observations upon the climatic features encountered by Alpine plants were made on San Francisco Mountain in August, 1898, by Messrs. MacDougal, and are referred to in this Report. These observations showed the usual mountain conditions of a smaller diurnal variation of temperature, and of greater differences between the temperatures of the air and of the soil than at lower levels. At 4 P.M., August 8, on the western slope of the peak, the soil had a temperature of 71.6°, and the air 57.6°; at 7 A.M. the next morning the minimum of 21.2° was obtained for the air, and 48.2° for the soil.

An interesting effect of wind-driven sand is noted (p. 22) as having been observed between Rimlon and Palm Springs, Cal. Here the sand-laden winds constitute a veritable sand blast. The western faces of the telegraph poles are deeply cut within two feet of the ground by the driven sand, and the employés of the railroad have found it necessary to pile up stones around the base of the poles to prevent their being cut off. A creosote bush in the lee of a small boulder had all its twigs which projected beyond the protection of the boulder killed by the sand blast, and the plant resembled a miniature box hedge about a foot and half wide, extending about four feet from the rock.

R. DEC. W.

Aperçu des Résultats météorologiques de l'Hivernage antarctique de la "Belgica." Par Henryk Arctowski. 12mo. Bruxelles, 1904.
pp. 41.

The meteorological results obtained on the *Belgica* expedition have already been discussed in more or less detail by M. Arctowski in various papers published in *Ciel et Terre* soon after the return of the expedition, and have been referred to in the BULLETIN. The present little volume, which is reprinted from the *Annuaire météorologique* of the Royal Observatory of Belgium for 1904, is the official summary of the results, which are presented in compact form, but with little discussion. The meteorological journal of the expedition, which has not yet been published, will, together with the papers already printed and the present report, give a complete survey of the meteorological work of the *Belgica* expedition.

R. DEC. W.

The Mystic Mid-region; the Deserts of the Southwest. By Arthur J. Burdick. With 54 illustrations. New York, G. P. Putnam's Sons, 1904. 8vo.

The region here described is from two hundred to five hundred miles wide, and from seven hundred to eight hundred miles long, and it extends far down into Mexico. It lies largely in eastern California, in Nevada, and in the extreme western portion of Arizona.

While this country is in many respects a formidable waste, there is much that is attractive in connection with it.

The narrow and restricted lives of the desert Indian tribes—the Panamints in the north, the Mojaves in the Mojave Desert, the Yumas lower down, and the Cocopas and the Seris in the

extreme south—are a wonderful example of the adaptability of man to conditions.

These people wring a scanty subsistence from their inhospitable land. Those who live near the Colorado catch fish; but to many of the desert dwellers fish and game are almost unknown. The cactus furnishes a large portion of their food. The fibres of the plant are woven into a coarse cloth, which gives them clothing, and mud and sticks form the materials for their houses. These people manufacture baskets, curios, and coarse pottery.

There is no greater mistake than to imagine the desert without plant life. Cacti in innumerable variety abound; there are also sage, mesquite, chaparral, and greasewood, and numbers of other plants, many producing beautiful flowers.

The mineral wealth of the desert is of no little importance. Death Valley has among the most important borax mines in the world—thirty thousand acres of deposits having been located to date. Gold, tin, copper, lead, zinc, iron, gypsum, sulphur, onyx, and other rare stones are also found here.

Portions of the mid-region are considerably below the level of the sea. In fact, there are two papers in the Colorado Desert printed below sea-level.

As an interpreter of the desert—its dreadfulness, its charm, its mystery, its wonderful variety—Mr. Burdick deserves very high praise. He writes out of a loving experience, and describes with charm and faithfulness.

U. F. D.

NOTES AND NEWS.

NOTICE TO FELLOWS OF THE SOCIETY.

The foreign delegates to the Eighth International Geographic Congress will be the guests of the Society during the three-days' session in this city, September 13-15. The business and proceedings of the Congress assigned to these days will be transacted at the house of the Society and in the lecture-rooms of the American Museum of Natural History through the kind co-operation of that institution. A large and important part of the scientific programme will be carried out in this city, and the Fellows of the Society will have an opportunity to attend the meetings and participate in the entertainments of this exceptional occasion.

The circular issued by the local committee in July urged our Fellows to become members of the Congress, and thus secure the privilege of attending all the sessions and lectures. The membership fee is \$5 and the associate membership fee (for ladies and minors) is \$2.50. The amount of these fees should be sent to the Committee of Arrangements, Hubbard Memorial Hall, Washington, D. C.

The social features of the New York meeting are expected to be generally attractive, and the hearty co-operation of all is invited to enhance their success. Information concerning them is given in the July Circular:

There will be a reception to the members of the Congress, at the rooms of the Society, on Tuesday evening, September 13th, at 9.15 P. M., to which all members of the Society are cordially invited.

It is also proposed to give a complimentary dinner to the delegates on Wednesday evening, September 14th, at 8 P. M., in the Hotel Endicott, Columbus Avenue and 81st Street. This dinner will be open to members of the Society upon payment of \$3.00 per plate.

It is further proposed to provide a daylight excursion up the Hudson River on Thursday, September 15th, as far as Fishkill, starting at 9 A. M. from the foot of West 129th Street. This excursion will be free to all members of the Congress, and to all members of our Society and their families.

Should you desire to attend either or all of these entertainments, kindly notify the Society of your intention at an early date, specifying the number of tickets you will need, as tickets will be required for each person.

It is hoped that all members of the Society who can be present will make an effort to attend.

THE EIGHTH INTERNATIONAL GEOGRAPHIC CONGRESS.—The attendance upon the first of these congresses to be held in America of a considerable body of distinguished scientific men from all parts of the world is now assured. More than 500 persons have registered as members. Over one hundred delegates from foreign geographical societies have expressed their intention to be present. The Government of the United States, as well as a considerable number of foreign Governments, will also be represented by delegates.

The Congress will be opened at Washington Sept. 8, and the first day will be chiefly given to the opening exercises at George Washington University Hall, to visits to the scientific bureaux, and to a lecture in the evening. On Friday, Sept. 9, the reading of papers will begin. Over 200 papers from the geographers of most civilized countries have been offered, and the scientific programme will be full of interest to geographers. The meetings in general

session or in sections will be continued through Saturday, the scientific programme in Washington being relieved by two social functions, a reception by Mrs. Gardiner Greene Hubbard at "Twin Oaks" at 5 p. m. on Friday, and a reception by Commander R. E. Peary, C. E., U. S. N., President of the Congress, and Mrs. Peary, at 8 p. m. on Saturday.

The Congress will spend Monday, Sept. 12, in Philadelphia under the auspices of the Geographical Society of Philadelphia. A field meeting will be held in Fairmount Park, with addresses by local and other geographers, and the rest of the day will be devoted to various social features.

The meeting of the Congress in New York City will occupy Tuesday, Wednesday, and Thursday, Sept. 13-15. The house of the American Geographical Society will be the headquarters in New York. The features of work and entertainment in this city are outlined in the Notice to Fellows of the Society in this number of the *BULLETIN*.

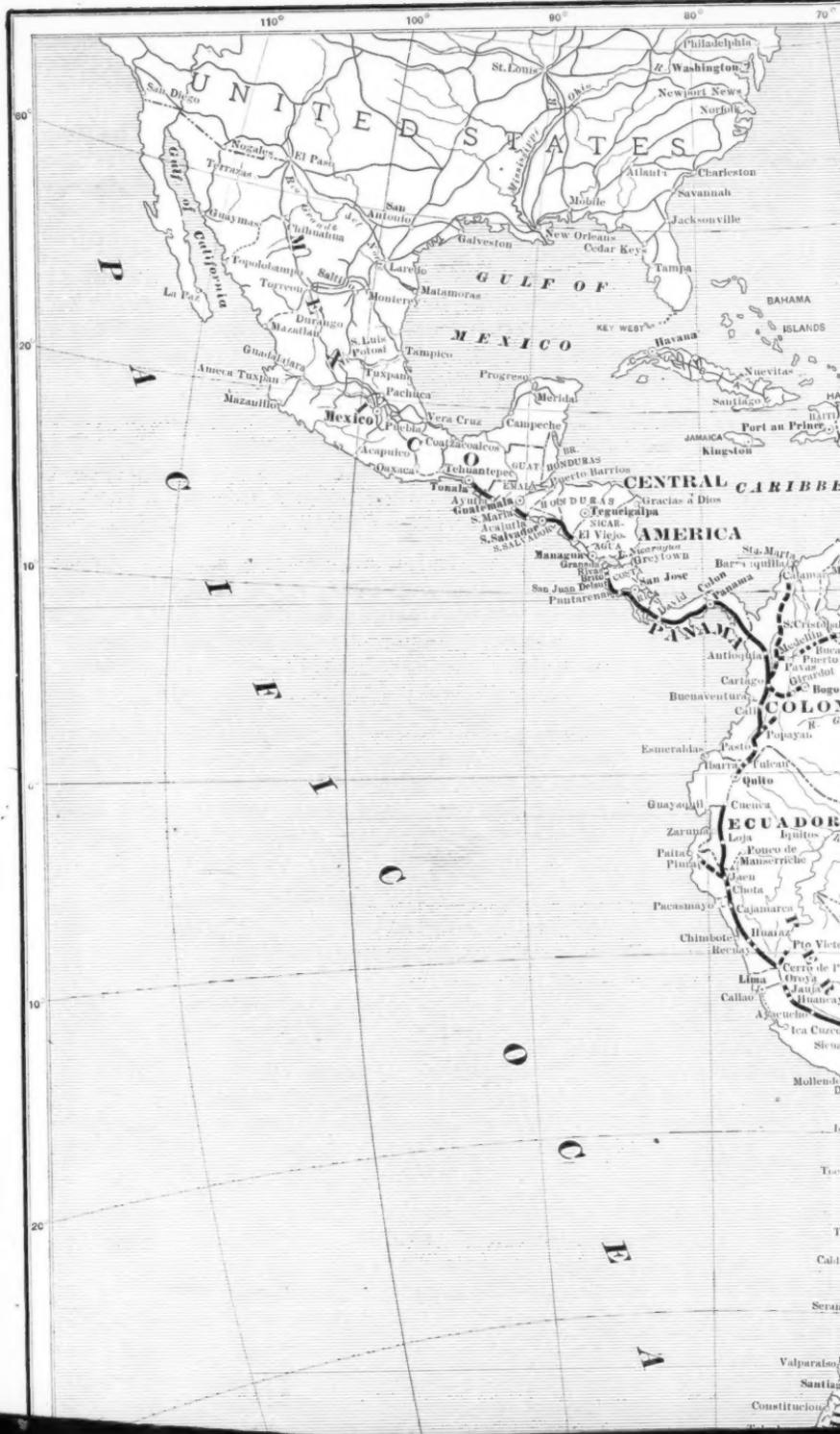
The Lenox Library invites the Congress to view a special exhibit of rare old maps and works on geography.

The Congress will spend twelve hours at Niagara Falls on Friday, Sept. 15. Dr. G. K. Gilbert will speak on the geographical development of the cataract, and there will be a general field meeting in charge of geographers familiar with the region.

Arriving at Chicago on Saturday morning, Sept. 16, a general session will be held at Cobb Hall, Chicago University, in the forenoon, and a reception will be tendered by the Geographical Society of Chicago in the evening.

After spending Sunday in Chicago the party will arrive in St. Louis on Monday morning, Sept. 19, where several meetings will be held in conjunction with the World's Congress of Science and Arts. President Peary will deliver a lecture on Tuesday evening, Sept. 20. An excursion has been arranged to the Grand Cañon of the Colorado and the City of Mexico, starting from St. Louis on Sept. 24 and returning to the same point in about twelve or fourteen days.

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THE PAN-AMERICAN RAILWAY

Based on the Map prepared by the
PAN-AMERICAN R.R. COMMITTEE

and accompanying the Report of

CHARLES M. PEPPER, Commissioner.

SCALE 1:40,500,000

SCALE OF MILES

0 100 200 300 600 900 1200

Pan-American Route, Main Trunk

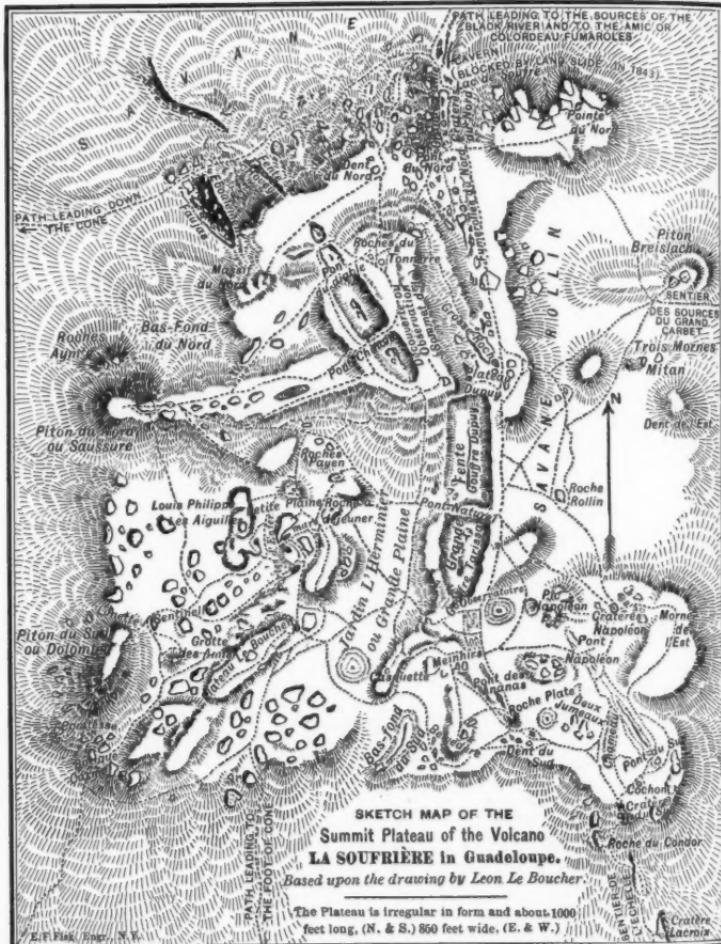
" " Proposed Connections

Railways in Operation

" under Construction or Surveyed

" Projected





SKETCH MAP OF THE

Summit Plateau of the Volcano

LA SOUFRIÈRE in Guadeloupe.

Based upon the drawing by Leon Le Boucher

The Plateau is irregular in form and about 1000

THE ECONOMIST 22